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# A SYSTEMIC ANALYSIS OF ERP IMPLEMENTATION CHALLENGES AND COPING MECHANISMS

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The Case of a Large, Decentralised, Public Organisation in South Africa

BY

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**Date: 21.07.2016**

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## *Dedication*

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***I dedicate this thesis to my family to whom I am forever indebted***

***Thank you for being my source of inspiration***

Avi for your endless love, sacrifices and for being my pillar of strength  
Aaren, Archana and Divya for the rays of sunshine and blissful moments

Mum and Dad for your endless love, prayers and enlightenment  
Dad in law for motivating me and bestowing your positive energy upon me.

---

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Thank you, dear Lord, for always guiding me and enlightening my path: Aum Bhuh Bhuvah Svah Tat Savitur Varenyam Bhargo Devasya Dheemahi Dhiyo Yo nah Prachodayat.

# A Systemic Analysis of Enterprise Resource Planning (ERP) Implementation Challenges and Coping Mechanisms: The Case of a Large, Decentralised, Public Organisation in South Africa

## Abstract

The relevance of this research stems from the persistent failure rate of large-scale Enterprise Resource Planning (ERP) implementations. The foremost reasons advanced in explaining organisations' failure to achieve the desired ERP benefits, despite substantial investments, relates to the complex, risky and challenging nature of the implementation process. Understanding the ERP implementation challenges faced by organisations and the subsequent coping mechanisms deployed to overcome the challenges remain a pertinent research endeavour. Another eminent area of concern alludes to the limited significance attributed to the systemic analysis of the implementation process.

This research describes the challenges faced by organisations during their ERP implementation process and explains the systemic interaction of the ERP implementation challenges. In conjunction, this study identifies the coping mechanisms established by organisations to overcome the encountered ERP implementation challenges.

An interpretive research paradigm, in concurrence with an inductive research approach was adopted for the purpose of this research. This study was conducted within the context of a large, decentralised, public organisation. Two embedded case studies within the designated organisation were selected. At the onset of the study, the organisation was in the process of implementing a large-scale vanilla ERP solution. The study was qualitative in nature and data were collected through interviews, observations and documentary evidence between April 2012 and October 2014. The ERP implementation challenges and ensuing coping mechanisms were revealed through the use of thematic analysis. Constant comparative analysis allowed the researcher to compare and contrast the data and themes emerging from both cases. The systemic interrelation and interconnected nature of the ERP implementation challenges were, subsequently, examined, using the principles of system dynamics.

Key research contributions comprise the development of both descriptive and explanatory knowledge. The research findings disclose numerous ERP implementation challenges resulting in the emergence of a taxonomy which includes organisational, project management, management, change management, technical and knowledge challenges. The proposed taxonomy provides a comprehensive breakdown and analysis of different ERP implementation challenges which adds to the existing body of knowledge on ERP implementation. The major theoretical contribution, however, is the explanatory theory arising from the systemic model of the dynamics of ERP implementation challenges. The theory provides rich insights into the complex and interconnected nature of an implementation process. Specific implications are drawn from the empirical findings to form theoretical propositions as principles of explanation and generalisation. Another key contribution includes an interpretation of how coping mechanisms are deployed by

organisations to overcome the ERP implementation challenges. The predominant coping mechanisms include the use of workaround solutions, workgroups, super-users, and retraining, support, and rewards and incentives. The theoretical contribution can be generalised to large, decentralised organisations implementing ERP systems. The contribution to practice is to assist organisations in their implementation endeavours by empowering ERP implementers with the fundamental knowledge in order for them to better manage the inherent complexity of their implementation processes.



### *Acronym Definition*

BPR	Business Process Reengineering
CFF	Critical Failure Factor
CFO	Chief Financial Officer
CIO	Chief Information Officer
CSF	Critical Success Factor
CX	Anonymised Business Unit
DX	Anonymised Business Unit
ERP	Enterprise Resource Planning
ES	Enterprise Systems
EU	End-user
GIS	Geographical Information System
GX	Anonymised Business Unit
IS	Information System
IM	Information Management
HCM	Human Capital Management
HR	Human Resource
KM	Knowledge Management
MM	Middle Manager
MS	Microsoft Software
PPM	Project Portfolio Management
R&D	Research and Development
RQ	Research Question
SA	South Africa
SAP	System Applications Products
SU	Support-user
TX	Anonymised Business Unit
UK	United Kingdom
US	United States
WFMS	Workflow Management System

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# A Systemic Analysis of Enterprise Resource Planning (ERP) Implementation Challenges and Coping Mechanisms: The Case of a Large, Decentralised, Public Organisation in South Africa

## 1 Introduction

This chapter sets the foundation for this research by introducing the research background, problem, purpose, objectives and questions. The chosen context of the study and the research justification are also established. This chapter concludes by outlining the structure of the thesis.

### 1.1 Research Background

Organisations are continually facing challenges, causing them to rethink and adapt their strategies, goals, structures, processes and technologies in order to remain competitive (Bhatti, 2005; Kwahk & Lee, 2008). Accordingly, many organisations choose to implement Enterprise Resource Planning (ERP) systems, with the aim of increasing productivity, efficiency and organisational competitiveness to gain a competitive edge (Kwahk & Lee, 2008; McKerlich, Ives, & McGreal, 2013; Ngai, Law, & Wat, 2008). ERP systems can be defined as integrated commercial software packages that integrate different business processes and information flows within an organisation (Davenport, 1998; Kumar, Maheshwari, & Kumar, 2003).

ERP systems were originally designed to support the business processes of organisations based on industry best practices, hence accounting for the standardised nature of such systems (Davenport, 1998). In most cases, though, there seems to be a misfit between the functionalities delivered by the vendor and the requirements of the end-customer (Shiang-yen, 2011; Soh, Kien, & Tay-Yap, 2000). ERP adoption requires that organisations adapt their work practices to the embedded processes inherent in the ERP system. This usually necessitates that organisations undergo major transformations; users have to come to terms with the organisational changes, new ways of work and unlearn previous practices (Robey, Ross, & Boudreau, 2002). Most enterprises are, therefore, compelled to customise their ERP packages in order to align their specific business needs to the capabilities provided by the systems, so as to achieve optimum business value. Customisation, however, poses a number of challenges to organisations, requiring major investments and leading to complex, risky and costly implementations (Panorama Consulting Solutions, 2015).

Nonetheless, ERP systems implementations remain prevalent (Upadhyay, Basu, Adhikary, & Dan, 2010). Many large multinational organisations have already implemented ERPs as their de facto enterprise systems (McKerlich et al., 2013). While developed countries have widely adopted ERP systems over the last decade, ERP vendors have tried to overcome “*the economic, cultural and basic infrastructural barrier*” related to emerging economies (Upadhyay et al., 2010, p.24). The ERP market has witnessed an upsurge in the implementation of ERP systems in emerging countries such as Brazil, India and China (Garg, 2010; Hawari & Heeks, 2010; Kamhawi, 2008; Ngai et al., 2008; Soja, 2011; Upadhyay et al.,

2010; Wong, Chau, Scarbrough, & Davison, 2005). Similarly, many organisations have invested in ERP systems in the South African manufacturing, financial, retail and public sectors (Moyo, 2014). Nevertheless, organisations still struggle to achieve the desired benefits, due to the complex, disruptive and threatening nature of ERP implementations (Panorama Consulting Solutions, 2015). Organisations continuously underestimate the complexity of implementing an ERP system, resulting in cost overruns, implementation delays and failures (Gargeya & Brady, 2005).

*“Despite its popularity, ERP implementations have been plagued with high failure rates and inability to realise promised benefits” (Kwahk & Lee, 2008, p.474).*

In effect, less than 10% of ERP implementations are completed with full functionality within the forecasted budget and time (Momoh, Roy, & Shehab, 2010). The 2016 ERP report by Panorama Consulting reveals that, for the year 2015, only 57% of the surveyed organisations categorise their implementations as successful (Panorama Consulting Solutions, 2016).

## 1.2 Problem Statement

Past studies show that the implementation of ERP systems exposes organisations to numerous socio-technical challenges encompassing people, organisation and technology, which need to be confronted in order to circumvent implementation failures (Bingi, Sharma, & Godla, 1999; Davenport, Harris, & Cantrell, 2004; Favour, 2014; Kumar et al., 2003; Soja, 2011; Umble, Haft, & Umble, 2003; Wong et al., 2005; Yusuf, Gunasekaran, & Abthorpe, 2004). Notwithstanding the universal acceptance of ERP systems, the implementation challenges faced by organisations during the implementation lifecycle remain a growing concern amongst scholars and practitioners (Momoh et al., 2010). Organisations need to be better prepared to deal with the different challenges which they may face during their ERP implementation process, hence an inherent need to understand the challenges an ERP implementation process entails (Sammon & Adam, 2010). However, an understanding of the ERP challenges is not adequate to alleviate the challenges organisations face. There is an additional need to identify the mechanisms which organisations can deploy to overcome the corresponding challenges encountered (T. Urus, Molla, & Teoh, 2011).

Another persistent concern is that, despite numerous studies focusing on critical success and failure factors, the views remain divergent and there exists no consensus on the set of factors that are deemed critical to the success of an ERP implementation (Ngai et al., 2008; Ram & Corkindale, 2014). One plausible reason relates to the fact that the studies were contextually driven within particular research settings and samples and within specific countries. As a result, their emphasis may have been on different sub-sets of critical success and failure factors (Ngai et al., 2008). Nonetheless, ERP implementation literature is heavily criticised for focusing mainly on factor research, with hardly any focus on the systemic evaluation of the implementation process (Chen, Law, & Yang, 2009; Kim, Lee, & Gosain, 2005; Venugopal & Rao, 2011). Although researchers have claimed that factor research is key to underline the variables which are critical for implementation success, it still merely represents a static view of the implementation process (Aladwani, 2001). A list of success



and failure factors does not focus on the interactions of the critical implementation issues and mostly assumes that each factor works in isolation with no causal effect on one another (Akkermans & van Helden, 2002). Conversely, implementing an ERP process is a dynamic process (Ngai et al., 2008), which results in the need to explore the critical implementation variables at a granular level (Chen et al., 2009). Understanding how the variables operate, how they interact with each other to influence the ERP implementation outcome and depict the dynamic holistic view of whole implementation process would constitute a valuable contribution to the existing body of knowledge (Venugopal & Rao, 2011; Yu, 2005).

Other research concerns reveal that ERP systems are known to embed mostly European or North American-based industry practices and cultures (Hong & Kim, 2002; Soh et al., 2000). Implementing ERP systems in different contextual settings might result in a more challenging implementation process arising out of specific organisational needs or specific contextual needs. Studies are, therefore, mandated to consider and assess the effect of unique organisational contexts. A unique organisational context defines the needs of an organisation which is fulfilled by an ERP solution (Soh et al., 2000). To date, the majority of the implementation studies have been undertaken in developed countries, warranting the need to conduct studies in developing countries to underline the contextual differences which may arise (Ngai et al., 2008). Moreover, implementation studies and implementation challenges faced by public organisations are scarce. Scholars stress that the implementation process in public organisations is likely to be more challenging due to their unique organisational contexts, hence the inherent need to extend the research focus to include further public sector implementations (Dwivedi et al., 2014).

### 1.3 Research Purpose

In order to address the research gaps discussed in section 1.2, this study seeks to analyse and describe the challenges faced by organisations during their ERP systems implementations. The selected organisation is characterised as a large, decentralised, public organisation. These challenges are identified from the perspective of several stakeholders, namely, end-users, super-users, project managers, compliance officers, support-users and managerial level employees, through use of thematic analysis.

A further objective of this research unveils how the ensuing ERP implementation challenges interact with each other from a systemic perspective. The study aims to uncover the relationships between the identified challenges through the use of system dynamics and causal loop modelling. Feedback loops are identified and propositions are drawn.

In an attempt to overcome the implementation difficulties experienced and to minimise business disruption, it is essential for organisations to manage and overcome the critical challenges faced during the different implementation phases. As such, a third objective of this research aims to explain the effect of coping mechanisms used by the organisation to mitigate the challenges faced. In the first instance, the coping mechanisms deployed by the organisation are unveiled through thematic analysis. Subsequently, a thorough analysis of the effect of the identified coping mechanism on the corresponding challenge is undertaken, followed by the generation of valid propositions based on the factual

information. Lastly, a sub-objective of this study also compares and contrasts the research findings to the epistemological findings of the literature.

## 1.4 Research Objectives

The three main research objectives of this research are therefore as follows:

1. To identify and describe the ERP implementation challenges faced by public organisations;
2. To understand how the ERP implementation challenges interact with each other from a systemic perspective;
3. To understand how organisations overcome the ERP implementation challenges they face:
  - a. to identify the coping mechanisms deployed by organisations to alleviate their ERP implementation challenges,
  - b. to understand and explain the consequential effect of coping mechanisms on the ERP implementation challenges.

The third objective was developed once the first round of interviews and preliminary analysis were completed, when it became apparent that the organisation relied on numerous coping mechanisms to overcome their encountered ERP implementation change.

## 1.5 Research Questions

Based on the above research objectives, the following research questions (RQ) have been devised.

- RQ1: What are the major challenges faced by public organisations when implementing an ERP system?
- RQ2: How do the ERP implementation challenges interact with each other from a systemic perspective?
- RQ3: How can organisations overcome their ERP implementation challenges through the use of coping mechanisms?

## 1.6 Research Context

This research has been conducted in a large, decentralised, public sector organisation in South Africa. At the onset of the research, the designated organisation was in the process of implementing an ERP solution. The organisation had made a decision to go with a SAP ERP vanilla solution for use throughout its different business units. Two cases were selected within the designated organisation to investigate the phenomenon of interest. The two cases were carefully selected to portray contrasting implementation outcomes, as elaborated in the research methodology chapter.

## 1.7 Research Justification

This research will be of immediate benefit to both academics and practitioners. From an academic perspective, this study explores challenges faced by large organisations during the implementation process. With the alarming rate of unsuccessful ERP implementation projects, understanding the challenges faced by organisations during the implementation lifecycle becomes increasingly important (Ehie & Madsen, 2005). Organisations are required to understand the impact challenges can pose to the overall success of the ERP project (Kim et al., 2005). This study, hence, contributes to the existing body of knowledge. Owing to the lack of studies that have investigated the subsequent strategies used to overcome the challenges faced by large organisations and the holistic interplay of the implementation challenges, this research is unique in nature and breaks some new ground, with the aim of contributing to the advancement of knowledge in this particular field. This research also provides a benchmark for any further future research which might be undertaken in the context of large, decentralised, public organisations in South Africa.

Through a practical lens, the results of this study can be generalised to large, decentralised, public organisations implementing a standard vanilla ERP system. The results of this study are expected to provide organisations with a comprehensive understanding of the critical implementation challenges faced during ERP implementations and the mechanisms and practices that can leverage the threats posed by these implementation challenges. Therefore, the mechanisms which can be used to overcome the ERP implementation challenges are presented and thoroughly discussed. Arguably, a segment of the findings will be more applicable to public sector organisations; nevertheless, the results will be of immediate benefit to large, decentralised organisations.

## 1.8 Structure of the Thesis

This section outlines the structure of the thesis which is organised into seven chapters, excluding the references and appendices.

Chapter one details the research background and problem statement, research purpose, objectives and questions, and the research justification and context of this study.

Chapter two reviews the existing body of knowledge pertinent to the context of this research. A systematic analysis of core implementation concepts is undertaken, pursued by a review of the implementation challenges and critical success and failure factors. The comprehensive scrutiny of the literature culminates with the gaps identified in literature.

Chapter three discusses the methodology underpinning the research with reference to the research paradigm, approach, data and strategy. Data collection and data analysis procedures are also expounded and ethical issues highlighted. The chapter introduces the case organisation and descriptions of the selected cases are provided.

Chapter four addresses RQ1 and details the challenges faced by public organisations during their ERP implementation process. A cross-case analysis is also undertaken to uncover any noted similarities and differences between the two cases.

Chapter five addresses RQ2 and provides a systemic analysis of the ensuing ERP implementation challenges through use of system dynamics and causal loop modelling. The resulting output is a systemic model of the complex and dynamic interactions of the ERP implementation challenge.

Chapter six provides an explanatory account on how the case organisation introduces various coping mechanisms to overcome the challenges faced whilst addressing RQ3. The different coping mechanisms are, initially, identified through thematic analysis. The corresponding relationships between the coping mechanisms and the ERP implementation challenges are, subsequently, examined, to finally proceed with providing an interpretation of the effects of the coping mechanisms in mitigating the existing challenges.

Chapter seven provides a synthesis of the research. The research questions and findings are revisited and key contributions of the research discussed. This chapter concludes with the limitations and impending thoughts for future research.

## 2 Literature Review

This chapter offers a systematic and critical review of the existing literature on ERP implementation. The objective is to acknowledge the existing epistemological knowledge while identifying the fundamental gaps which need to be closed, following the limitations and recommendations of prior research.

### 2.1 Organisation of the Chapter

To begin with, section 2.2 looks at the different perspectives used to define an ERP system. Section 2.3 provides a short overview of its evolution, followed by an overview of the ERP market in section 2.4. The ensuing section identifies the perceived benefits of implementing ERP systems. A comparative view of the studies conducted in a developed versus developing context is undertaken in section 2.6, followed by the difference between public and private sector implementations. Section 2.8 compares the various ERP implementation approach strategies while section 2.9 reviews the implementation lifecycle of an ERP system. A review of the different success and failure criteria used to assess the implementation outcome is presented in section 2.10. The ensuing sections differentiate between critical success and failure factors, and ERP implementation challenges. Sections 2.14 to 2.30 review the different ERP implementation challenges. An overview of the systemic interplay of the ERP implementation variables is presented in section 2.31. Section 2.32 summaries the main discussion points of this review while the literature gaps are unveiled in section 2.33.

### 2.2 Enterprise Resource Planning (ERP) Systems

ERP systems are characterised as large, complex, multifunctional, modular and generic systems which support and integrate the key functional areas of an enterprise (Nafeeseh & Al-Mudimigh, 2011). Some of the key enterprise functions that ERP systems support include supply chain management, inventory control, sales, manufacturing scheduling, customer relationship management, financial and cost management, and human resources (Aslan, Stevenson, & Hendry, 2012; Rashid, Hossain, & Patrick, 2002).

ERP systems have been defined using different perspectives, ranging from technical and functional to a holistic business perspective (Shiang-yen, 2011). Through a technical lens, ERP systems include a set of software modules which generally aim to serve diverse enterprises through a consolidated database (Shiang-yen, 2011). These systems support day-to-day operations, decision-making and automation, streamlining and improvement of processes in organisations (Aslan et al., 2012). From a functional perspective, ERP systems are defined as information systems (IS) enabling the integration and automation of business procedures, whereas, through a holistic business processes lens, ERP systems enable enterprises to restructure, manage and integrate business processes within and across functional areas of an enterprise as well as across different organisations (Xu, Rahmati, & Lee, 2008). An ERP system is, therefore, more than merely an IT solution and implementing an ERP system can be considered as *“a change management initiative which encompasses a review of business processes across the whole organisation, requiring careful management”* (Skok & Legge, 2002, p.72).

## 2.3 Evolution of ERP Systems

The first generation ERP systems began as Materials Resource Planning (MRP) which focused on providing optimal material quantities based on the bill of materials. MRP was later redefined into a more sophisticated system referred to as Materials Resource Planning II (MRP II), facilitating materials and capacity planning through long-range and high-level resource planning, master scheduling, rough-cut and detailed capacity planning, and shop floor control (Møller, 2005; Umble et al., 2003; Xue, Liang, Boulton, & Snyder, 2005). MRP systems allowed manufacturing companies to efficiently manage their production processes (Umble et al., 2003). The improved technological capabilities of the 1990s enabled organisations to incorporate new modules such as financial accounting and management accounting into the MRP system, allowing organisations to have a more integrated view of the organisation. The beginning of the 1990s witnessed a surge of new functionalities being added to the MRP system. The system could integrate and plan for all the different functional areas such as product design, information warehousing, materials planning, capacity planning, communication systems, human resources, finance and project management of an organisation. All these additional developments gave rise to the ERP system which was no longer limited to only manufacturing organisations. The general idea was that the ERP system could be implemented by any organisation wanting to integrate its operations (Umble et al., 2003).

In an attempt to improve process efficiencies and to achieve operational excellence, the next evolution cycle introduced the second generation ERP systems which targeted new organisational boundaries by integrating the supply chain (Møller, 2005). The second generation ERP systems, therefore, included supply chain management and supply relationship management components, with all the major ERP vendors adopting this new standard (Møller, 2005).

ERP systems' continuous evolution later gave rise to a third generation that allowed for the integration of knowledge management (KM), providing organisations with the ability and tools required to transform into a knowledge-based learning organisation and to use KM as a strategic initiative to create competitive business solutions (Xu, 2011).

## 2.4 The ERP Market

Despite the presence of numerous ERP vendors, the ERP market is dominated by a few vendors who claim more than 50% of the market share (Panorama Consulting Solutions, 2015). The ERP market grew by 3.8% in 2014. Figure 2-1 illustrates the major ERP systems vendors. SAP continues its dominance as the market leader with a 24% market share and sales revenue amounting to \$6.1 billion in 2013, while Oracle shows a \$3.117 billion sales revenue (Forbes, 2015; Panorama Consulting Solutions, 2015).

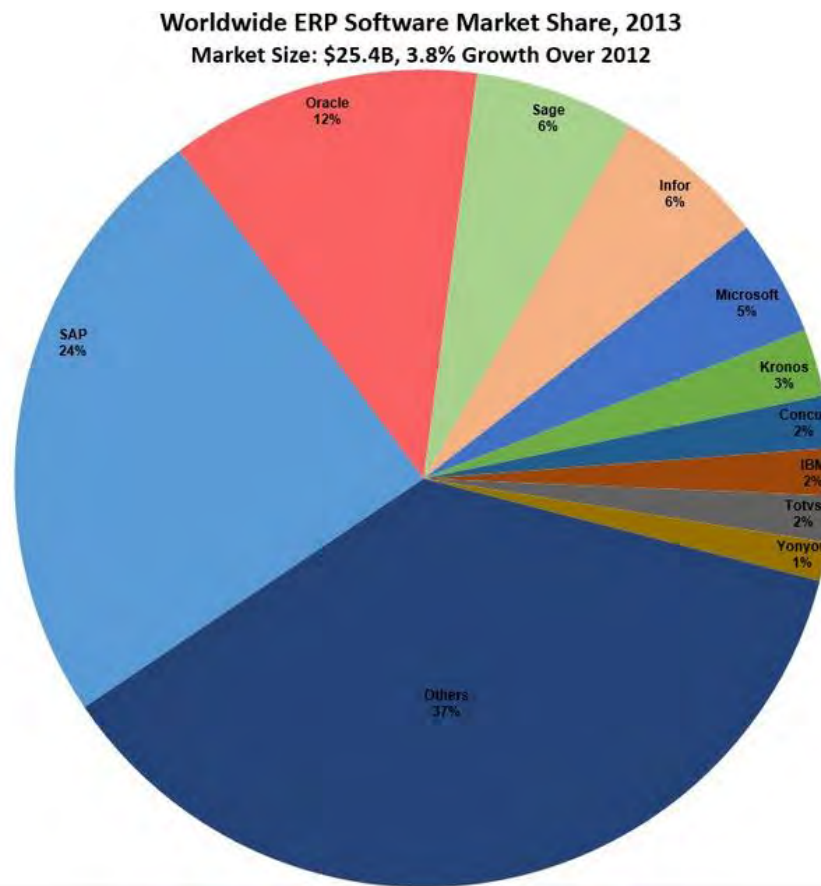


Figure 2-1: Worldwide ERP Software Market Share 2013 (Gartner Research, 2014 as cited by Forbes, 2014)

## 2.5 Perceived Benefits of Implementing ERP Systems

Organisations adopt ERP systems for three principle reasons, namely, the ability to integrate information, to optimise processes and for improved decision-making capabilities, referred to as the ability to informate. These three value builders are seen as the primary benefits of adopting ERP systems (Davenport et al., 2004).

Built on the value proposition of integration, ERP systems promise organisations seamless integration of its information processes, business processes and systems, both across and beyond organisational boundaries (Bingi et al., 1999; Davenport et al., 2004; Laukkanen, Sarpola, & Hallikainen, 2007).

Regarded as a core value realisation pillar, optimisation refers to the reengineering and standardisation of business processes to reflect best practices. By reengineering their processes to fit the strategic needs of the business, organisations seek to improve their productivity and performance.

The ability to informate, on the other hand, allows organisations to transform the consolidated data into information and knowledge for empowered decision-making. In fact, Davenport's survey revealed that the ability to make informed decisions for improved business performance was the foremost benefit that organisations were competing for (Davenport et al., 2004).



The above claims are supported by recent research findings. The needs to enhance organisations' productivity, data integration and both individual and consolidated decision-making capabilities remain the top-most benefits organisations seek to gain. Other noted benefits include responding to competitive forces, increase in business flexibility, better response to customers, standardisation of the processes and reduction of cost structures (Kamhawi, 2008; Laukkanen et al., 2007).

A more recent study conducted by Panorama Consulting revealed the perceived ERP benefits. The study was based on 215 completed surveys and aimed to better understand customer experience with regard to ERP applications, vendors, consultants and the overall implementation process (Panorama Consulting Solutions, 2016). The perceived justifications for the implementation of ERP systems are illustrated in Figure 2-2.

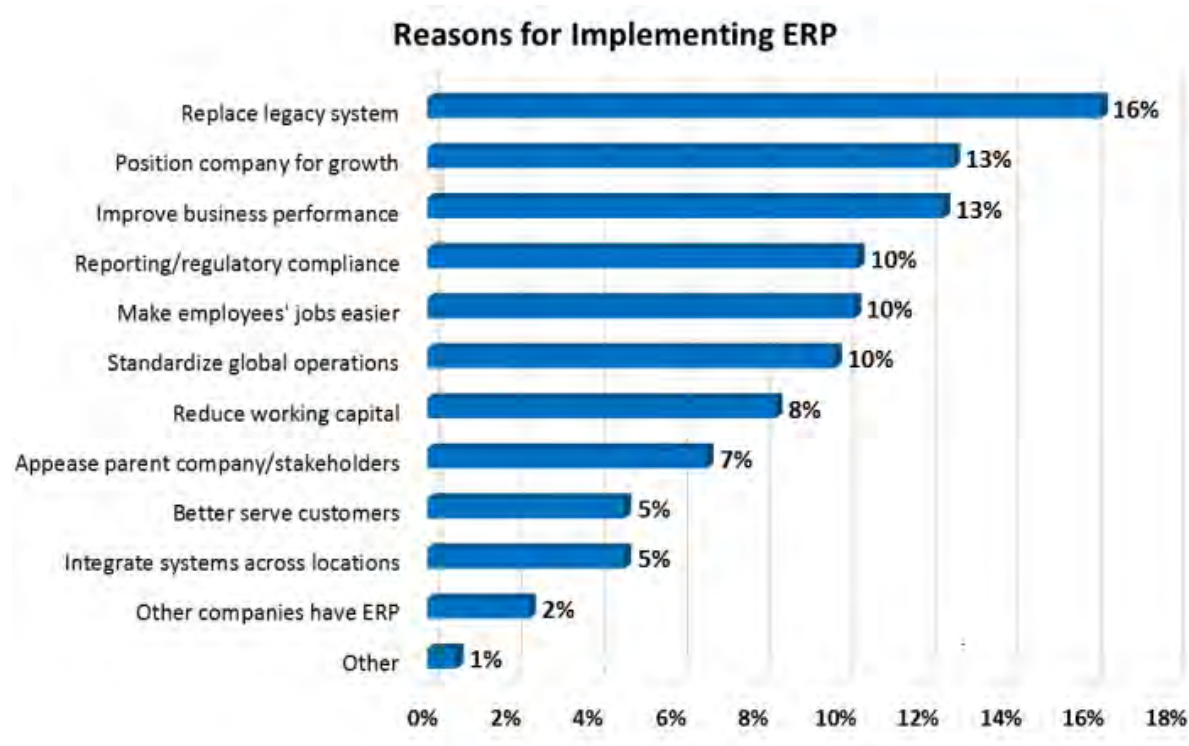


Figure 2-2: Reasons for Implementing ERP systems (Panorama Consulting Solutions, 2016)

Sixteen per cent of the sample implemented ERP systems as a means to replace their legacy systems while 13% of the sample considered an ERP implementation in order to position their companies' for growth. Another 13% of the respondents implemented ERP systems for improved business performance while 10% looked to improve their reporting and regulatory compliance. Approximately 10% of the sample opted for ERP systems to simplify their employees' tasks and to standardise their processes respectively, whereas 8% looked at the reduction of their working capital. Seven per cent of the surveyed organisations implemented ERP systems to appease their stakeholders. Five per cent of the respondents believed ERP system would help them to better serve their customer base and another 5% looked for better systems integration across multiple locations. A small percentage of organisations implemented ERP systems to match their competition.



Despite the numerous perceived benefits of ERP solutions, 65% of the studied sample indicated that they received less than 50% of the expected measurable benefits (Panorama Consulting Solutions, 2016).

## 2.6 The contrasting view of the ERP market: Developed versus Developing Nations

ERP systems have been widely deployed in developed countries all over the world to automate and streamline business processes to achieve global competitive advantage. The ERP market is, undoubtedly, dominated by developed countries which includes the United States (US), Canada, Australia and Western European countries where a wide acceptance of the use of the system has been proven (Shaul & Tauber, 2013), as opposed to emerging and developing nations where the ERP market is still in its early stages (Hawari & Heeks, 2010; Ngai et al., 2008).

In 2001, 66% of ERP sales revenue was generated from Canada and the US, while the sales revenue from European countries amounted to approximately 22%. At the time, the ERP sales accounted for only 9% and 3% revenue from the Asian and Latin American countries respectively (Huang & Palvia, 2001).

In consequence, there has been a vast amount of documented ERP implementation studies undertaken by developed nations. A meta-analysis of the literature by Ngai et al. (2008) noted that, as predicted, most of the ERP implementation research was conducted in the US where the major proportion of ERP revenues originate. Nevertheless, an increasing number of emerging nations have embraced the adoption of ERP systems in recent years. Unfortunately, research in these countries has not followed suit, resulting in a lack of studies explaining ERP processes and implementation (Ngai et al., 2008). Further focus on research should be emphasised in emerging nations and the inherent need for additional studies cannot be ignored, as the contextual differences between developing and developed countries cannot be overlooked (Soja, 2011). This assertion was initially made by Huang and Palvia (2001) who laid the claim that there would be fundamental differences arising due to diverse global contexts. Consequently, studies undertaken in developed countries cannot be ported to developing countries without a number of profound assumptions. Palvia and Huang (2001) further identified a number of national, cultural and organisational issues which would impact, in radical ways, the implementation of ERP systems, from a developing economy context. Despite the presence of generic implementation issues, an ERP project implementation remains unique in many ways (Mabert, Soni, & Venkataramanan, 2003). ERP implementation issues faced by emerging countries are bound to be different, particularly in areas such as human resource and the socio-political environment (Bingi, Leff, Shipchandler, & Rao, 2000; Soja, 2011).

Nevertheless, ERP implementations targeting Asian, Eastern European and Middle East markets are relatively well researched in comparison to research conducted in an African context (Ngai et al., 2008). The last decade, in particular, saw the emergence of studies focusing on Asian, Eastern European and Middle East countries (Al-Mashari & Al-Mudimigh, 2003a; Chen et al., 2009; Kamhawi, 2008; Sheu, Chae, & Yang, 2004; Soh et al., 2000; Soja,

2011; Xue et al., 2005; Zhang, Lee, Huang, Zhang, & Huang, 2005). However, apart from a handful of studies conducted in South Africa, ERP implementation research in other African countries remains elusive (Mohammadreza, Asefeh, & Mohammad, 2010). Table 2-1 summarises the few studies focusing primarily on ERP implementation in South Africa.

*Table 2-1: ERP Studies conducted within South Africa*

Authors	Context	Main Findings
<b>Mushavhanamadi and Mbohwa (2013)</b>	South African company, ERP implementation and Critical Success Factors	The findings claim that while inadequate budget can lead to the failure of an ERP system, skills constraints and inability to select the right implementation team can hamper successful ERP implementation.
<b>O'Donovan, Seymour, Geldenhuys, Isaacs, and Kaulule (2010)</b>	South African metropolitan municipality, ERP implementation and organisational memory mismatches	Organisational mismatches and short-term coping strategies such as working overtime, use of multiple workaround systems contribute to ERP underperformance whereas long-term coping strategies such as training will eventually increase ERP efficiency.
<b>Seymour and Roode (2008)</b>	Large enterprises, ERP implementation and job impact	A framework explaining the impact of an ERP implementation on users' job impact was derived. Five main categories of conditions (implementation actions, system perceptions, facilitating conditions, job impact and affective response) were discussed.
<b>Seymour, Makanya and Berrange (2007)</b>	Large enterprises, ERP implementation and user acceptance	The study reported on the factors influencing end users acceptance. ERP systems do not achieve their perceived benefits because end-users do not accept the system.

## 2.7 Public Sector versus Private Sector Implementations

Scholars have acknowledged the need to extend implementation research to public sectors (Dwivedi et al., 2014). While ERP implementations initially involved mostly private sector implementations, public sector ERP implementations have been on the rise (Sommer, 2011; Wagner & Antonucci, 2009). ERP implementations in public sectors are bound to be more challenging, due to the organisational complexity and structure of such organisations (Dwivedi et al., 2014; Wagner & Antonucci, 2009). However, comparatively fewer studies

have targeted public sector implementations (Chang et al., 2000; Dwivedi et al., 2014; Wagner & Antonucci, 2009).

## 2.8 ERP Implementation Approach

ERP implementations fall into three main categories, namely: comprehensive, middle-road and vanilla (Parr & Shanks, 2000). Each approach is characterised in terms of its physical scope, business process reengineering (BPR), technical scope, resource allocation and module implementation strategy. A comprehensive implementation generally occurs across a multinational enterprise and consists of multi-site implementations. Such an implementation requires a high level of BPR and the modules are customised to some extent. In contrast, a vanilla approach is commonly perceived as least ambitious, with the implementation usually deployed on one site only. In such an approach, the scopes of BPR and customisation remain minimal and the purpose is, primarily, to align the organisation's processes to that of the ERP (Parr & Shanks, 2000; Soh et al., 2000). Lastly, a middle-road implementation is seen as the intermediate option (Parr & Shanks, 2000).

## 2.9 ERP Implementation Lifecycle

Predominantly regarded as different from the software development lifecycle due to its unique nature (Brehm & Markus, 2000), an ERP lifecycle covers at least three core fundamental phases, namely, pre-implementation, implementation and post-implementation. The pre-implementation phase is characterised by various planning activities and it involves numerous decision points regarding the ERP system to be deployed. Some of the key activities include communication of the strategic goals, selection of a vendor, securing top management commitment, recruitment of key employees, decisions involving the implementation approach, designing a change management and risk management plan. The implementation phase is the actual phase where the ERP system is deployed and some of the major activities include project management, BPR, constant communication, user involvement, client consultation, and education and training. Finally, the post-implementation phase includes the execution of critical activities, such as post-implementation audits and benefits realisation, to ensure the ERP system acceptance. (Abdinnour-Helm, Lengnick-Hall, & Lengnick-Hall, 2003; Mandal & Gunasekaran, 2003; Motwani, Subramanian, & Gopalakrishna, 2005; Razi & Hossain, 2012).

### 2.9.1 ERP Implementation Lifecycle Frameworks

#### ERP System Experience Cycle

One of the widely cited ERP implementation lifecycle frameworks used in literature is the "ERP system experience cycle", as proposed by Brehm and Markus (2000). Throughout an enterprise system implementation, an organisation goes through four ideal phases, namely, the chartering phase, project phase, shakedown phase and onward and upward phase. Each phase provides the organisation with a unique experience characterised by multiple stakeholders, various project decisions and activities, challenges, and performance metrics and project outcomes (Markus, Axline, Petrie, & Tanis, 2000). The four above-mentioned phases are briefly discussed in the following section.

**Project Chartering:** In this phase, a business case is drawn to seek funding for the project. The key stakeholders comprise of vendors, consultants, IT specialists and company executives. Some of the main activities include selection of an organisational fit enterprise system, identification of a project manager and the approval of project schedule and budget. Although performance metrics are not always formally defined in this particular phase, possible metrics may include quality of business cases, alignment of the solution to business strategy, and suitability of budget and schedule (Markus et al., 2000).

**Project Phase:** The enterprise system is deployed in one or more organisational units with the core activities including software integration, configuration, testing, data conversion, roll-out and training. The stakeholders involved in this phase are project managers, both technical and functional project team members, IT specialists, vendors and consultants. The key performance indicators primarily assess project performance through project scope, schedule and budget (Markus et al., 2000).

**Shakedown Phase:** The shakedown phase is characterised by the organisation's attempt to adapt to the new enterprise system and to resume all normal operations. This is a crucial phase for the organisation, as a number of errors are only detected in this phase. Key activities include bug fixing, system rework and reskilling of personnel where required. Many enterprise systems are abandoned in this phase. Key performance indicators monitoring the ERP system's and employees' performance are put in place (Markus et al., 2000).

**Onward and Upward Phase:** This stage can be compared to the post-implementation phase, as discussed earlier. The organisation evaluates the benefits of the enterprise system. A post-implementation audit assessing the investment against benefits realisation is usually conducted in this phase. The business performance is continuously monitored to evaluate implementation outcome. Consequently, the organisation can choose to upgrade or to replace the system (Markus et al., 2000).

Since its inception, numerous studies have operationalised the 'ERP system experience cycle'. Kumar et al. (2003) reported on the actions and challenges of the project and shakedown phase as experienced by Canadian organisations, whereas Wong et al. (2005) identified implementation issues and critical failure factors applicable to each of the discussed implementation phase. Nah and Delgado (2006) further affirmed that the 'ERP system experience' model can be used to depict the lifecycle of ERP upgrades as well.

Another popular implementation lifecycle model used in the literature is that of Cooper and Zmud (1990) who define six implementation phases, namely, initiation, adaption, adoption, acceptance, routinisation and infusion. Somers and Nelson (2001) identified the five most important critical success factors in each of the above-mentioned implementation phases (Somers & Nelson, 2001). Shaul and Tauber (2013) have presented a comprehensive synthesis of the various ERP implementation lifecycle models used in the implementation literature, as depicted in appendix 9.1. Owing to the scope limitations of this research, other prominent implementation models are not covered.

## 2.10 Understanding the IS Project Outcome

Historically, there has been much debate in the literature with regard to defining and assigning suitable success and failure variables to projects, since the concept of success and failure is preconceived and can, therefore, have distinct meanings to different individuals (Thomas & Fernandez, 2008). The most commonly adopted definition in the IS research sphere is that of Myers (1994), who defines project success in terms of stakeholders' perceptions. More explicitly, a project is deemed as a success only when the stakeholders see it as successful (Myers, 1994).

The outcome of an IS implementation can fall into three different categories, namely, total failure, partial failure and success. An implementation is categorised as a total failure either when the selected solution is ultimately not implemented or when the implemented system is immediately abandoned during or after implementation. A partial project failure status is designated in instances where the major goals are not realised and/or the delivered project outcomes are a mismatch from the initial planned objectives. Lastly, a project is classified as a success when significant project outcomes are met and the majority of the stakeholders are satisfied with the attained project goals and do not experience any undesirable outcomes (Heeks, 2002).

### 2.10.1 ERP Project Outcome

Similarly, the success or failure of ERP implementation projects is determined through different measures (Ram & Corkindale, 2014). ERP success can be measured objectively through use of financial figures such as costs and profits, or subjectively through particular selected measures defined by the organisation (Dezdar & Ainin, 2011b; Ram & Corkindale, 2014). The use of project management variables as a single measure to gauge whether a project is a failure or a success, has been a subject of much debate (Wateridge, 1998) as, ultimately, the ERP implementation success depends on the subjective viewpoint of individuals evaluating the project (Dezdar & Ainin, 2011a). Using this approach, project managers would most likely weigh the success of a project against the time and budget criteria, whereas end-users would relate to the satisfaction derived through use. As for management, a project would be deemed successful when it has achieved its business goals and outcomes.

While some studies have employed a set of traditional project management variables such as time, budget and predetermined project goals to assess an ERP implementation success (Hong & Kim, 2002; Mabert et al., 2003), others have utilised user satisfaction as their sole project measure (Wu & Wang, 2007). However, the majority of studies have essentially employed a combination of the aforementioned variables as their success measures (Chien, Hu, Reimers, & Lin, 2007; Dezdar & Ainin, 2011a; Zhang et al., 2005).

Another segment of the literature has based their project evaluation criteria on the IS success model by DeLone and McLean (1992), as discussed in section 2.10.2.

### 2.10.2 The DeLone and McLean (D&M) Framework

Numerous studies have utilised some or all the six dimensions of the IS success model by DeLone and McLean (1992) as a measure of their ERP implementation success (Chien et al., 2007; Chien & Tsaur, 2007; Fan & Fang, 2006; Seddon, 1997).

In an attempt to provide a parsimonious explanation of an overall IS success measure, DeLone and McLean (1992) proposed the D&M IS success model with six interdependent constructs measuring IS success, as depicted in Figure 2-3. The model is derived from a comprehensive review of multiple literature sources that looked at individual measures of IS success (DeLone & Mclean, 1992). The original D&M IS success model was subsequently refined to include net benefits as a measure of success (DeLone & Mclean, 2014).

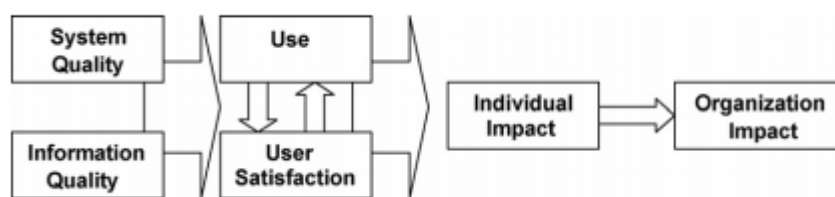


Figure 2-3: IS success Model (DeLone & McLean, 1992)

According to the model, system quality and information quality can singularly or simultaneously impact use and user satisfaction. The extent of use can have either a positive or negative effect on user satisfaction and vice versa. Use and user satisfaction, in turn, lead to individual impact which influences organisational impact. These different dimensions are explained in the subsequent section.

System quality refers to the desired features and characteristics of the system itself in terms of reliability, flexibility and accessibility. Information quality relates to the quality of output as produced by the solution. Some of the information quality metrics refer to information accuracy, output timeliness, completeness, relevance and precision (DeLone & Mclean, 1992).

Both use of a system and user satisfaction have historically been common measures of success, with both variables sharing a high degree of correlation (DeLone & Mclean, 1992). DeLone and McLean (1992) define user satisfaction as the response to the use of an IS. However, in cases where use of an ERP system is mandatory, use as a measure becomes distorted and user satisfaction, resultantly, becomes a more significant and realistic measure of the system's success. The extent of user satisfaction can, therefore, in this situation, be a more accurate measure of success to use.

Individual impact assesses the behaviour of an individual in terms of productivity, the capability of better decision-making, the ability to see things differently or the change in an individual's view with regard to the usefulness and benefit of the system in question. Organisational impact represents a more systemic view and can be seen as a summation of the collective individual impact; the resultant effects of the IS are improved organisational effectiveness, productivity and profitability. Organisational impact can be measured through

net savings or the competitive advantage gained through use of the IS (Delone & Mclean, 1992).

## 2.11 Understanding the Difference between Critical Success Factors (CSF) and Critical Failure Factors (CFF)

ERP systems are, generally, characterised by their complexity and wide footprint in the enterprise with regard to scope. Implementing an ERP system is seen as a multifaceted project which exposes organisations to numerous challenges owing to the complexity involved (Kumar et al., 2003) and, as a result, gives rise to a high failure rate of ERP systems on the whole (Chen et al., 2009; Kwahk & Lee, 2008). Consequently, in an attempt to ensure a successful implementation outcome and to reduce implementation failures, numerous studies have focused on unveiling the critical success factors (CSFs) or critical failure factors (CFFs) when implementing an ERP system (Allen, 2008; Bingi et al., 1999; Chen et al., 2009; Kim et al., 2005; Ngai et al., 2008; Umble et al., 2003).

The end of the 90s era and the start of the 21<sup>st</sup> century witnessed an upsurge in the number of studies focusing on CSFs and CFFs in the context of ERP implementations (Ehie & Madsen, 2005; Holland & Light, 1999; Mandal & Gunasekaran, 2003; Nah, Tan, & Beethe, 2005; Somers & Nelson, 2001, 2004; Umble et al., 2003; Yusuf et al., 2004).

CSFs and CFFs have been used interchangeably by many researchers, with few studies clearly delineating them, therefore giving rise to some confusion in the research sphere. CSFs are described as key areas which organisations need to get right during the implementation cycle to achieve a successful outcome. These are areas where “*things must go right*” (Bullen & Rockart, 1981, p.7) for the implementation goals to be attained (Ngai et al., 2008). Subsequently, in an attempt to increase the probability of an ERP implementation success, identifying CSF literature became a dominant research stream of ERP literature (Ram & Corkindale, 2014).

Despite the occurrence of a large body of knowledge focusing on CSF, the literature cites numerous examples where organisations have been unsuccessful in realising the benefits of ERP systems (Chen et al., 2009; Kumar et al., 2003; Momoh et al., 2010). The failure rate of ERP implementations remains high, with organisations experiencing major implementation difficulties (Liu & Seddon, 2009; Ram & Corkindale, 2014), leading to arguments that the primary factors contributing to an ERP success differ from those causing an ERP implementation failure (Gargeya & Brady, 2005).

This claim is affirmed by Momoh et al. (2010) who claim that the absence of some CSFs during an ERP implementation does automatically lead to an implementation failure (Momoh et al., 2010). The factors which guarantee actual implementation failures, when overlooked, are commonly referred to as critical failure factors (CFFs). CFFs exhibit a higher “*imminent sense of urgency and reality*” (Momoh et al., 2010, p.557), making it imperative for companies to understand the factors that contribute to the failure of ERP implementations. These factors can be used “*as a guide for future implementations, in order*



*to aid them in avoiding the failures that have been experienced in other implementations”* (Momoh et al., 2010, p.557).

Nevertheless, CSFs and CFFs, in many cases, are closely related and have been used interchangeably based on the epistemological assumptions and core theoretical foundations undertaken by the different studies (Al-Mashari, Al-Mudimigh, & Zairi, 2003; Soja, 2011). This is exemplified by Soja (2011) who explains how different implementation issues can be perceived as either CSFs or CFFs by organisations (Soja, 2011). Participants were asked to identify the issues they faced during the implementation cycle, following which the author attempted to distinguish between the issues that had a higher contribution to implementation success and the issues which acted as the most significant failure factors. The result highlights top management support as more frequently associated to CSF, whilst occasionally perceived as a CFF. On the other hand, participant knowledge is seen as a significant CFF but not generally perceived as a CSF. A comparison between the perceived importance of CSFs and CFFs between organisations from the developed countries and Polish companies was also undertaken which, Soja (2011) argues, can be generalised to emerging economies. While a number of similarities between developed and emerging countries have been noted, fundamental differences have also been highlighted. Factors such as provider support/relationship, BPR and training are seen as less significant in emerging economies, whereas factors such as infrastructure and people’s attitudes are deemed more critical in emerging economies.

In order to better comprehend the differences and similarities, a synthesis to gain a better understanding of the meaning and context of use from literature is undertaken in the subsequent sections.

#### 2.11.1 [Reviewing the ERP Implementation CSFs](#)

While the majority of studies have attempted to identify and produce a comprehensive list of CSFs to aid management in their implementation efforts (Dezdar & Sulaiman, 2009; Holland & Light, 1999; Somers & Nelson, 2004), others classified the CSFs along the ERP implementation lifecycle (Nah, Lau, & Jinghua, 2001), while some ranked their identified CSFs in order of importance (Nah, Zuckweiler, & Lau, 2003).

Holland and Light (1999) derived a CSF framework based on a meta-analysis of existing literature with the intent of assisting managers during the formulation of ERP implementation strategies (Holland & Light, 1999). Their framework categorised the CSFs as either strategic or tactical factors.

Nah et al. (2001) identified and categorised 11 CSFs, based on the implementation lifecycle model as proposed by Markus and Tanis (2000). Different factors may have varying levels of importance during the different phases of the implementation, hence the need to identify the point at which the selected factors come into play. Nah et al. (2001) identified ERP teamwork, top management support, effective communication, project management and project champion as factors indispensable throughout the ERP implementation lifecycle. Business plan and vision, and appropriate business and IT legacy systems are deemed crucial in the initial chartering phase, while change management, minimum customisation, and



software development and testing become crucial from the project phase to the end of the ERP implementation cycle. Constant monitoring and evaluation of performance is considered important in the shakedown phase. Finally, reaffirmation and reinforcement of the business vision become vital yet again in the onward and upward phase (Nah et al., 2001). The classification of the aforementioned factors across the ERP life-cycle model is depicted in appendix 9.2.

Nah et al. (2003) further expanded the above findings by ranking the above mentioned CSFs in order of importance. Questionnaires were sent to Chief Information Officers (CIOs) who then ranked the identified CSFs based on their perceived importance and criticality. The topmost five significant factors, as perceived by the participants, included top management support, project champion, ERP teamwork and composition, project and change management. Communication, business plan and vision, BPR, software development and testing, monitoring and evaluation, and appropriate business and IT legacy followed suit in order of importance (Nah et al., 2003). Their rankings, to a certain extent, are aligned with those of Somers and Nelson (2004) who produced a categorised list of 22 CSFs along the different stages of an ERP implementation lifecycle.

The last decade witnessed a growing number of studies aiming to synthesise the existing literature on CSFs (Dezdar & Sulaiman, 2009; Finney & Corbett, 2007; Ngai et al., 2008; Ram & Corkindale, 2014; Shaul & Tauber, 2013). The main objective of these studies was to provide a consolidated and general view of the CSFs due to their noted diversity across different studies.

A recent systematic review of the CSF literature includes the study conducted by Shaul and Tauber (2013) who scrutinised 243 articles from the year 1999 to early 2010 and provided a comprehensive taxonomy of the existing state of the CSF literature (Shaul & Tauber, 2013), as depicted in Figure 2-4.

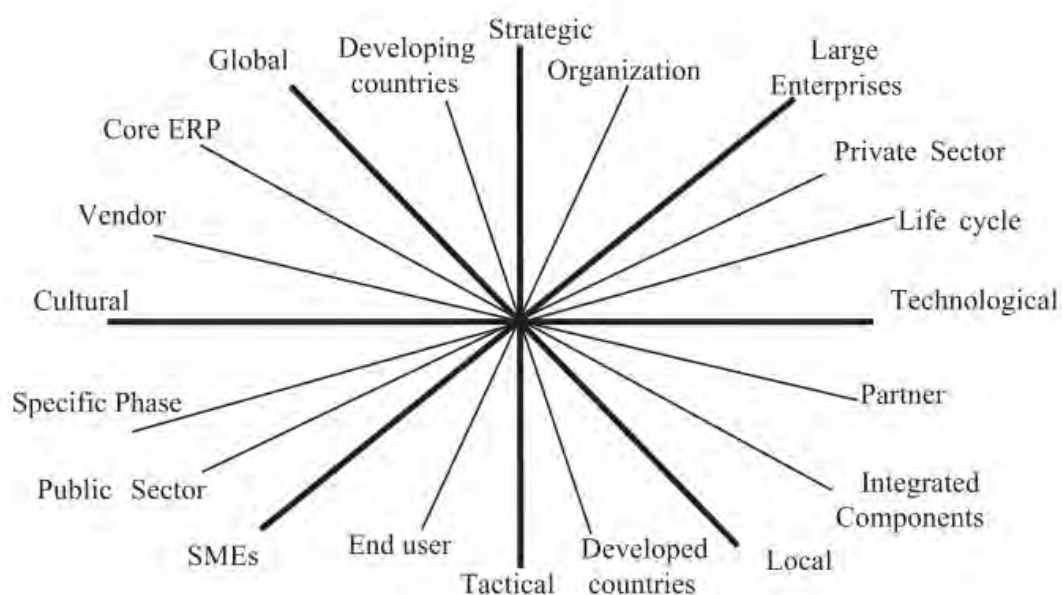


Figure 2-4: Taxonomy of the CSF Literature (Shaul & Tauber, 2013)

Through their meta-analysis of CSF literature, Finney and Corbett (2007) scrutinised 45 articles and grouped 24 categories of CSF categorised as either strategic or tactical factors, following Holland and Light's (1999) classification. The authors further cited the frequency of occurrences of each identified CSF in the literature. Top management commitment and change management are the most cited CSFs (Finney & Corbett, 2007).

Dezdar and Sulaiman (2009) undertook a systemic evaluation of the CSF literature between the years 1999 and 2008 to develop a taxonomy of CSFs. They argued that the earlier taxonomies did not represent an up-to-date view of the existing literature. The ever-rapid evolution of technology and product lifecycle, might have given rise to new success factors. Moreover, the varying contexts of the prior research led to diverse classifications, hence a need to consolidate the existing literature to form a holistic view of CSF and ERP implementation. The result of their study unveiled 17 CSFs, further grouped into three main categories, namely, ERP system environment, adopting organisation environment and ERP implementation success (Dezdar & Sulaiman, 2009). The proposed taxonomy is depicted in appendix 9.3.1. One of the main differences unveiled between this particular research and that of Finney and Corbett (2007) is the identification of user involvement and system quality as CSFs. Ram and Corkindale (2014) reviewed 236 CSF-related papers and categorised the identified CSFs into organisational-, project-, technological- and individual-related factors (Ram & Corkindale, 2014).

Ngai et al. (2008), on the other hand, undertook a cross-analysis and assessed the similarities and differences of CSFs across developed and developing countries from the following areas; America, Europe, Australia, Asia, Middle East and Arab Gulf states. Eighteen CSFs were outlined and the authors affirmed that 11 of these were similar to those proposed by Nah et al. (2000). They concurred with prior studies that CSF such as top management support, project management, ERP teamwork and composition, and change management were deemed critical for ERP implementation, regardless of contextual differences, whether national or cultural. Interestingly, they highlighted that some factors, such as setting up realistic deadlines, dedicated resources and management of expectations, were cited more frequently in the US, Denmark and the UK as compared to the developing countries. The researchers argue that this difference might explain why developed nations are more likely to succeed in their implementation efforts (Ngai et al., 2008). The study, however, did not include any countries from Africa.

#### 2.11.2 Reviewing the ERP Implementation CFFs

While factor research mostly focuses on CSFs, a few studies have explored the CFFs and the fundamental differences between CSFs and CFFs (Barker & Frolick, 2003; Momoh et al., 2010; Soja, 2011; Wong et al., 2005). Through a qualitative case study focusing on four different companies who failed in their ERP implementation endeavours, Wong et al. (2005) derived a list of 14 CFFs. Three of the scrutinised companies had their headquarters in China. The fourth company's headquarters were based in Europe with production plants in China and Taiwan. Poor project management, poor consultancy and poor BPR were experienced by all of the four surveyed cases. The findings are depicted in appendix 9.3.2.

Momoh et al. (2010) cited excessive customisation, internal integration predicaments, lack of business and requirements understanding, poor data quality, misalignment between IT and the business, hidden costs, inadequate training and lack of top management support as CFFs (Momoh et al., 2010). Other frequently cited failure factors include lack of system testing, lack of human resource capability, and cultural misfits and knowledge barriers (Gargeya & Brady, 2005; Sedera, Gable, & Chan, 2003; Soh et al., 2000).

### 2.11.3 Critique of the CSF and CFF Literature

The literature on CSF and CFF faces heavy criticisms for producing laundry lists of divergent factors (Finney & Corbett, 2007; Momoh et al., 2010; Ngai et al., 2008; Ram & Corkindale, 2014).

A prominent concern is that, despite the existence of a large body of knowledge, the rate of ERP failures is high, leading to questions on the usefulness and criticality of CSFs and CFFs. Ram and Corkindale (2014) emphasise that out of the 236 CSF-related papers, 141 focus solely on the identification of CSFs across the stages of the ERP implementation lifecycle, as opposed to empirically establishing the validity of each identified CSF against actual implementation projects. Of those remaining empirical studies, only 18 papers focus on CSF based on management issues, while 77 papers study the impact of CSF on the implementation project outcome.

The facts that there is no agreed, standard process to identify CSFs and CFFs and that a myriad of different research methods, techniques and contextual settings may be used to derive the CSFs and CFFs, contribute to the partiality of what constitutes a critical factor (Ngai et al., 2008; Ram & Corkindale, 2014). Moreover, most of these studies adopt a reductionist approach, whereby only a particular aspect of the implementation process is examined, in contrast to taking a more holistic approach, therefore giving rise to a constellation of diverging disparate results (Finney & Corbett, 2007; Ngai et al., 2008).

Another highlighted concern is the lack of emphasis on key stakeholders' perspectives with regard to the formulation of the critical factors. Individual views of different key stakeholders, including lower level employees and external stakeholders such as customers, suppliers and wholesalers, are seldom investigated and studied (Finney & Corbett, 2007; Skok & Legge, 2002). Consequently, emphasis should be placed on understanding the needs of the various stakeholders from a systemic perspective (Bajwa, Mooney, Garcia, & Deepinder s. bajwa, 2004).

## 2.12 Understanding the ERP implementation Challenges

One of the plausible explanations of the high ERP implementation failure rates relates to the fact that many organisations lack the necessary understanding to undertake an ERP implementation and, consequently, are likely to confront a number of organisational, cultural, technological and political challenges throughout the implementation cycle (Momoh et al., 2010; Skok & Legge, 2002; Yusuf et al., 2004).

Implementation challenges are described as the primary problems organisations encounter during their ERP implementations (Kamhawi, 2008; Momoh et al., 2010). Primary problems

can include existing organisational challenges. Subsequently, in order to better understand the ERP implementation process, these challenges should, first and foremost, be given due consideration and be addressed, promptly and effectively, to ensure a successful implementation outcome (Bingi et al., 1999; Kumar et al., 2003; Yusuf et al., 2004). In effect, Kumar et al. (2003) state that once the ERP implementation challenges are identified, the primary aim for organisations should be to address these challenges in order to increase the likelihood of achieving a successful ERP implementation outcome. Therefore, organisations are required to understand the pertinent implementation challenges they face and ought to find adequate means of addressing the challenges in order to ensure a smooth roll-out and a successful project implementation (Bingi et al., 1999; Kumar et al., 2003; T. Urus et al., 2011).

The next segment of this research focuses on reviewing the ERP implementation challenges faced by organisations, followed by an analysis of the identified challenges. In line with the terminologies used in literature, the terms: problems, constraints, limitations and issues, have been used interchangeably to refer to implementation challenges in the context of this research.

### 2.13 Reviewing the ERP Implementation Challenges

A comprehensive review of the literature has been conducted to uncover the ERP implementation challenges faced by organisations. Some of the identified implementation challenges include change management and project management concerns and resource and technical constraints (Kamhawi, 2008). Yusuf et al. (2004) classify the implementation challenges into three main categories, namely, business, technical and cultural challenges.

Studies conducted by Kumar et al. (2003) and Markus et al. (2000) go a step further and attempt to identify the different implementation challenges which organisations may encounter at different stages of the implementation lifecycle (Kumar et al., 2003; Markus et al., 2000). Both studies use the ERP experience lifecycle model to uncover the common problems. Kumar et al. (2003) focus on the project and shakedown phase while Markus et al. (2000) classify the issues along the chartering, project, shakedown, and onward and upward phases. Common difficulties encountered by organisations in the chartering phase include failure to link the technology to the business strategy, poorly defined project metrics, poor understanding of organisational requirements and poor change management. In the project phase, organisation may experience staffing problems, poor knowledge transfer from consultants and vendors, poor quality of documentation and configuration errors, while the challenges experienced in the shakedown phase include bug fixing, data inconsistency, slow system performance and failure to resume to optimal performance (Kumar et al., 2003; Markus et al., 2000).

The next section provides a detailed analysis of the widely discussed ERP implementation challenges. Figure 2-5 illustrates the adopted approach to analyse the ERP implementation challenges. Implementation challenges are first identified from the literature, following which a general description of the challenge is postulated along with the categorisation of the challenge as either a CSF or a CFF. Subsequently, examples of the impact of the

identified challenge on the ERP implementation outcome are outlined. The causes and consequences of each identified challenge along with the ensuing strategies used to address the implementation challenge are, wherever applicable, discussed.



Figure 2-5: Approach Used to Identify Implementation Challenges

## 2.14 Change Management Challenges

Change management challenges have been highlighted as one the primary challenges faced by organisations implementing an ERP system. In effect, a lack of change of management has been referred to as a leading cause of implementation failure, as organisations constantly experience lack of change management initiatives leading to ERP implementation failures (Momoh et al., 2010; Somers & Nelson, 2004). Change Management has been widely mentioned as both a CSF and a CFF factor (Aladwani, 2001; L. E. Allen, 2011; Al-Mashari & Al-Mudimigh, 2003; Finney & Corbett, 2007; Momoh et al., 2010). However, despite the significance of change management, the literature does not clearly differentiate between the different change management sub-constructs or provide a comprehensive review of the change management tactics used to overcome the related challenges (Finney & Corbett, 2007).

Some of the frequently quoted change management concerns include underestimating organisational change and users' resistance to change (Kim et al., 2005; Markus et al., 2000; McAdam & Galloway, 2005; Momoh et al., 2010). These sub-factors are discussed in the subsequent sections.

### 2.14.1 Underestimating the Impact of Organisational Change

An ERP implementation is seen as such a difficult endeavour because it involves managing a complex organisational change across multiple *"key areas related to strategy, technology, culture, management systems, human resources and structure"* (Al-Mashari & Al-Mudimigh, 2003, p.22). This transformation is always accompanied by a fundamental change to organisational processes that involves multiple stakeholders, ultimately disrupting their principles, their beliefs and the prevailing way they have been conducting their operations (McAdam & Galloway, 2005).

In actual fact, an ERP implementation is known to change the overall organisational culture and organisations have been guilty of underestimating the impact of this change (Davenport, 1998; McAdam & Galloway, 2005; Skok & Legge, 2002). In the past, the people aspect of implementations received the least amount of attention (Gargeya & Brady, 2005; Kim et al., 2005) and this is still regarded as one of the costliest implementation mistakes made by organisations (Davenport, 1998). There are instances where organisations are so overwhelmed with the organisational changes and the difficulty of managing the changes that they have to completely abandon their implementation efforts midway through the

process (Davenport, 1998). Similarly, through their study focusing on the implementation of an ERP system in a large manufacturing organisation, McAdam and Galloway (2005) noted that the misjudgement of the impact of organisational change was one of the early unforeseen change management challenges they were faced with (McAdam & Galloway, 2005).

Understanding the impact of organisational change and the strategies needed to manage the transformation is a key concern faced by organisations (Kim et al., 2005), with numerous studies explicitly mentioning adequate management of organisational change as a CSF (Shaul & Tauber, 2013). An ERP implementation should therefore be viewed as an organisational undertaking, as opposed to a stand-alone IT effort (Yusuf et al., 2004), while the ERP implementation should be managed as a comprehensive effort where everyone's primary focus is on the change (Somers & Nelson, 2001).

#### 2.14.2 User Resistance

Another key component of change management and a leading ERP implementation challenge is user resistance (Aladwani, 2001; Gargeya & Brady, 2005; Kamhawi, 2008; Kwahk & Lee, 2008). User resistance is described as the opposition of users to perceive change related to a new IS implementation (Markus, 1983). Although ERP systems are implemented successfully from a technical perspective, eventual success cannot be guaranteed and may be inhibited by users' reluctance to use the delivered system (Kim et al., 2005).

User resistance has been recognised as both a CSF and a CFF (Soja, 2011; Wong et al., 2005), though Soja (2011) states that user resistance is mostly seen as a critical implementation failure and only a few studies regard it as a CSF. Prior studies undertaken by Momoh et al. (2010) and Wong et al. (2005) support Soja's claim as these studies establish user resistance as a CFF. Similarly, through their study focusing on critical issues organisations face when implementing an ERP system, Kumar et al. (2003) establish the significance of resistant behaviour on behalf of both end-users and managerial employees as a critical concern. The results are based on data collected from 20 ERP project managers who highlighted their topmost concerns (Kumar et al., 2003), while Kamhawi (2008) notes that user resistance is one of the primary change management challenges faced by organisations in Bahrain. Yusuf et al. (2004) cites resistance to change as a major risk factor as the ERP implementation of Rolls-Royce progressed. The project implementation team anticipated reluctance to accept new work practices, despite improved processes and functionalities.

Classified as either functional or dysfunctional, user resistance is a critical implementation challenge. Functional resistance indicates the problems inherent to the ERP solution, whereas dysfunctional resistance relates to resistant behaviour of users that, ultimately, obstructs the adoption of the solution which could have been beneficial to the organisation. In the latter case, resistance is regarded as destructive as it leads to organisational disruption. Regardless of whether resistance is functional or dysfunctional, it must be addressed by the organisation (Markus, 1983; Rivard & Lapointe, 2012). The following subsection provides an overview of the causes of user resistance, followed by an overview of the strategies to alleviate the latter.



### Causes of User Resistance

A lack of top management support, wrong assignment of people to the implementation team and a lack of user involvement have been identified as causes of user resistance (Cissna, 1998, as cited by Momoh et al., 2010). Moreover, a lack of system quality and a lack of satisfaction arising from initial system usage will lead to partial usage of the system and the upsurge of local solutions to address the perceived functionality gaps of the ERP system (Worley et al., 2005, as cited by Momoh et al., 2010).

Aladwani (2001) identifies perceived risk and habit as sources of user resistance. While perceived risk is described as users' outlook of the risk associated with the change brought by an ERP solution, habit refers to the existing practices as conducted recurrently by users (Sheth, 1981, as cited by Aladwani, 2001). Resistant behaviour might be explained through the understanding of the values and beliefs of users. Users might not see the need for implementing an ERP system as they assert their efficiency and effectiveness of conducting their assigned tasks without the use of an ERP system. Some may be overcome by fear of losing their jobs, while others may be threatened by the eluding power and authority they command (Hultman, 1979, as cited by Aladwani, 2001).

### Overcoming User Resistance

Aladwani (2001) advocates a three-level change framework to influence and help overcome user resistance. The proposed strategies can be used by organisations to shift users' cognitive power by creating favourable conditions whilst influencing users' decisions to accept the implemented ERP system. Communicating the benefits of the new system, teaching users how to effectively use the system, while clarifying the inputs and outputs of the system, are some of the proposed strategies which can be used to influence and shift users' cognitive power. Furthermore, gaining the support of influential groups and securing the right time to implement an ERP system can further reinforce a positive attitude. Lastly, the support of senior management should not be overlooked throughout the implementation cycle. Adequate support from top management remains the overriding condition for overcoming user resistance. Senior management needs to remain committed to the change initiative throughout the implementation to ensure the eventual acceptance of the ERP system (Aladwani, 2001).

Rivard and Lapointe (2012), in their study, analysed how user's resistant behaviour changes in response to the different behaviours of ERP system implementers. ERP system implementers, in this particular case, refer to both top and middle management and IT personnel, including IT consultants. A taxonomy of implementers' responses including inaction, acknowledgement, rectification and dissuasion is discussed. Each response can cause user resistance to either decrease or increase. Inaction can be broken down as unawareness, deliberate ignorance and impotence. Rectification is further divided into congruent and non-congruent sub-categories, while dissuasion can be grouped as coercion, and authoritative and supportive persuasion. Each of these actions can either lead to a positive or adverse effect on the initial resistant behaviour. The findings show that inaction, acknowledgement and non-congruent rectification eventually result in non-use of the implemented system; eventually, end-users revert to usage of their prior systems.

Congruent rectification can successfully decrease the resistance, ensuring eventual acceptance and use of the newly implemented system. Authoritative and supportive persuasion as well as coercive behaviour can lead to either an increase or decrease of user resistance, depending on the contextual environment.

## 2.15 Inadequate Training and Education

An ERP implementation requires extensive investment in employee training and education (McAdam & Galloway, 2005; Nah et al., 2001). Training and education includes the training of the organisation's personnel to ensure familiarity and proficiency of the ERP system (Chan & Rosemann, 2001). Ensuring that users understand and become capable users of an ERP system demands rigorous training. Consequently, organisations are required to invest in the training and education of their employees to enhance their skills and understanding of the new business processes, functions and new responsibilities (Bingi et al., 1999; Somers & Nelson, 2001), and to ensure that key knowledge is transferred from the consultants to the employees for the former to, ultimately, reside within the organisation (Chan & Rosemann, 2001).

Although training and education have been treated as both a CSF (McAdam & Galloway, 2005; Nah et al., 2001; Soja, 2011; Somers & Nelson, 2001) and a CFF (Momoh et al., 2010; Soja, 2011; Wong et al., 2005), historically, the trend has been for organisations to attribute little importance to the training and education of their employees (Gargeya & Brady, 2005). This claim is supported by Soja (2011) who underlines that practitioners continue to disregard the impact of inadequate training on the implementation outcome. Moreover, the findings portray that training is less frequently perceived as a CSF or a CFF by Polish organisations, when compared to the developed countries.

As a result, inadequate user training is a noted concern for managers (McAdam & Galloway, 2005) and is attributed as the root cause of many failed ERP implementations (Gargeya & Brady, 2005; Momoh et al., 2010; Somers & Nelson, 2001). Organisations fail to acknowledge the required minimum learning curve associated with the ERP implementation (Somers & Nelson, 2001).

Time and budget allocated to the training and education of the employees is usually limited with minimal resource allocation and a significant percentage of organisations running out of training budget (Kumar et al., 2003; Wong et al., 2005). This leads to employees' confusion, inability to understand how to use the system and their ultimate reluctance towards system usage (Gargeya & Brady, 2005; Kumar et al., 2003; Wong et al., 2005). Reluctance to accept and use the system potentially poses a huge financial risk to the organisation (Gargeya & Brady, 2005), given the investments in such undertakings.

Other prominent training challenges include the difficulty in setting up the required training logistics, which includes selecting the right facilitators to provide end-user training, providing adequate training to the facilitators themselves, setting up training facilities with the right infrastructure and the preparation of quality training documentation (Kumar et al., 2003). Training content is usually perceived as being inadequate with lack of attention to detail, thus hampering the holistic understanding of how the ERP system functions.



Moreover, the high demand for skilled ERP professionals leads to a high turnover of skilled ERP employees, resulting in the constant need to train new employees. Moreover, the evolving nature of the ERP systems results in the need for constantly updating the training materials and, consequently, the need for regularly retraining employees (Kumar et al., 2003).

Researchers further argue there is a need for a more systematic approach to training and education and that there are two levels of handling the people aspect of ERP implementations. Adequate training of the employees is, without a doubt, a crucial aspect, but educational exposure and practical awareness also play a significant part. Educational exposure can be described as the awareness and knowledge required by managers to understand the implications of the changes to their environment (Huang, Yen, Chou, & Xu, 2003; McAdam & Galloway, 2005; Worley, Chatha, Weston, Aguirre, & Grabot, 2005). Should managers not understand the changes and their impact, they will neither show enthusiasm nor be committed to the change, which could, eventually, result in the display of active resistance towards the system (Davenport et al., 2004).

## 2.16 Lack of Communication

Lack of adequate communication and communication breakdowns are other widely discussed implementation challenges faced by organisations. Organisations implementing ERP systems might experience numerous communication challenges, particularly between the project team and the rest of the employees within the organisation (Soja, 2011). ERP consultants and developers are notorious for speaking in a different language, as opposed to business managers and users, leading to conflicting views (Skok & Legge, 2002).

The critical nature of effective communication as a success factor throughout the implementation cycle is discussed by many researchers (Chen et al., 2009; Holland & Light, 1999; McAdam & Galloway, 2005; Nah et al., 2005; Sarker & Lee, 2003; Somers & Nelson, 2004), while a number of studies acknowledge that communication breakdown represents a major obstacle which can result in an implementation failure (Al-Mashari & Al-Mudimigh, 2003; Barker & Frolick, 2003; Soja, 2011). Communication-related challenges experienced by organisations have, traditionally, been more emphasised in the US and Europe as compared to the rest of the world (Ngai et al., 2008).

Cited as a necessary condition for ERP success (Shanks et al., 2000), honest communication is essential as it helps to build the competence of the organisation and works towards attaining commitment and buy-in from different stakeholders (Al-Mashari & Al-Mudimigh, 2003; Barker & Frolick, 2003). Open, clear, formal communication channels need to be established to ensure that required information is seamlessly distributed throughout the different departments and organisation. Due to the complex nature of an ERP system, a 'one size fits all' communication strategy is not often adequate (Finney, 2011). For instance, face-to-face communication might be more effective in certain situations, as opposed to the use of electronic mediums. These claims are supported by Skok and Legge (2002) who reveal that the electronic communication medium used by the ERP consultants can differ from what the organisation desire. For instance, the organisation may prefer a more

personal interaction with the different external stakeholders, while the consultants may rely on electronic media with minimum personal interaction. It is crucial, therefore, to recognise the need of different stakeholders to understand their preferred communication strategies and to understand that particular media of communication are required for specific circumstances.

Barker and Frolick (2003) discussed how communication challenges plagued an ERP implementation of a large, major soft-drink bottler. Top management and the assigned project team did not attribute much importance to disseminating key information to the employees. This resulted in a communication breakdown whereby employees were unaware of the purpose of the newly implemented system and its subsequent impact on their job functions. The resultant consequence was an overwhelming increase in users' anxiety and resistance to use the system, leading to a number of resignations.

Similarly, in the study focusing on a failed ERP implementation of a major manufacturing organisation, lack of formal communication channels proved to be one of the core reasons accounting for its failure. Stakeholders relied on newsletters and ad hoc social events to understand the organisational changes and this proved to be inadequate to gain their support and commitment (Al-Mashari & Al-Mudimigh, 2003). An inadequate communication plan addressing the needs of different stakeholders was also given as one of the reasons accounting for the failed ERP implementation (Al-Mashari & Al-Mudimigh, 2003). A contradictory view is, however, provided by Sarker and Lee (2003) who, through their case study, established that an open and honest communication channel is not a necessary condition for successful ERP implementation. Their findings revealed that, despite the lack of open and honest communication, two implementation projects under scrutiny had a successful outcome.

## 2.17 Lack of User Involvement and Incentives

Another challenge organisations face refers to the decision on the extent of users' involvement during the implementation process. Lack of user involvement is recognised as a leading cause of user resistance (Aloini, Dulmin, & Mininno, 2007; Barker & Frolick, 2003; Shah, Khan, Bokhari, & Raza, 2011). Aloini et al. (2007) categorise limited user involvement as a risk factor negatively impacting the implementation outcome.

A number of studies attribute strong user involvement as a CSF of ERP implementations (Barker & Frolick, 2003; Xue et al., 2005; Zhang et al., 2005). Through their research focusing on four different case studies of ERP implementation in the Chinese market, Zhang et al. (2005) unveil that companies with a strong emphasis on user involvement are more likely to succeed in their implementation efforts.

Barker and Frolick (2003) discuss the need for organisations to assess their workforce, select key employees and understand their desire to be involved to ensure a satisfying outcome. Ensuring the involvement of users throughout the implementation process is a crucial step towards breaking down communication barriers (Barker & Frolick, 2003) and removing power blockages (Skok & Legge, 2002). Rewarding employees' hard work should not be overlooked either. The limited budget allocated to the people component of ERP

implementations restricts an organisations' ability to provide incentives and rewards. Barker and Frolick (2003) highlight the impact of a lack of recognition on employees' morale. The lack of appreciation and lack of incentives can lead to employees' frustration.

## 2.18 Project Management Concerns

Project management activities span from the start to the end of a project. A project can be regarded as an attempt to create a service or a product. An ERP implementation aims to provide both a service and a product to end-users. By extension, the implementation of an ERP system in an organisation can, hence, be regarded as an entire project in itself which, therefore, requires project management (Somers & Nelson, 2001). Implementing an ERP project requires project management knowledge which is described as *"the knowledge required to manage the entire implementation process as a single project"* (Chan, 1999, p. 27).

Managing ERP projects is regarded as an organisational approach, consisting of planning, organising and controlling, while also seeking to achieve outputs such as milestones and objectives (Duncan, 1996, as cited by Chan, 1999). Project management is a noted CSF and a CFF since poor project management practices can jeopardise the whole implementation project (Chen et al., 2009; Gargeya & Brady, 2005; Nah & Delgado, 2006; Nah et al., 2001; Soja, 2011; Somers & Nelson, 2001; Umble et al., 2003).

Adherence to schedule, budget and scope are key constraints faced by organisations when implementing ERP systems. These dimensions have, in the past, been used as the golden triangle; impacting project success and an oversight from any one of these dimensions is known to lead to project failures (Chen et al., 2009; Kim et al., 2005; Kumar et al., 2003; Momoh et al., 2010). While implementation time, cost and scope constraints remain the most debated project management concerns, the challenges faced by organisations in project management knowledge areas, such as quality, human resources and integration, have also been highlighted by different studies (Chen et al., 2009; Kim et al., 2005). The subsequent sections explore the different project management challenges faced by organisations.

### 2.18.1 Implementation Schedule and Cost Constraints

Managing the implementation costs and timelines of an ERP project are undeniably amongst the most prominent project management challenges organisations face (Kamhawi, 2008; Kumar et al., 2003; Soja, 2011; Wong et al., 2005).

Organisations repeatedly underestimate the cost and time of an ERP implementation (Xu, Horn, Noel, & Daryl, 2002). A typical ERP implementation lifecycle may last several years before completion (Bingi et al., 1999; Chen et al., 2009; Okrent & Vokurka, 2004). While an ERP implementation phase typically lasts about 15 months, the whole implementation cycle itself can take between four and eight years to complete. However, the time required to implement an ERP system may vary according to the complexity and extent of the organisation's business processes (Bingi et al., 1999; Panorama Consulting Solutions, 2015; Yusuf et al., 2004).

ERP projects are notorious for exceeding the allocated budget and planned schedules. The Panorama Report (2015) reveals that, indeed, 58% of projects exceeded their planned budgets with 10% of the organisations going over more than 50% of their original budget. Sixty-five per cent of the implemented projects exceeded their estimated timelines with 20% of the projects running twice as long as originally scheduled. In their survey, the average cost of an ERP implementation in 2015 amounted to \$3.8 million (Panorama Consulting Solutions, 2016).

Upfront costs of ERP systems include the cost of consultants, cost of hardware and cost of software. In actual fact, the cost of the software only accounts for a small portion of the total cost, usually only 10% to 15% of the total cost (Ehie & Madsen, 2005; Xu et al., 2002). Continual maintenance costs including the cost of upgrade, cost of new equipments, cost of training, cost of daily operations and cost of staffing also need to be accounted for (Chan, 1999).

#### 2.18.2 The Root Cause of Incorrect Time Estimations

Organisational challenges, project scope expansion and data challenges negatively impact initial project timelines, resulting in unmet deadlines and, consequently, failure or partial success of ERP implementation projects (Panorama Consulting Solutions, 2015; Xu et al., 2002). Project schedules are revisited mainly because of incorrect estimations of the volume of tasks, unrealistic project schedules, newly added functionalities and dependent tasks which take longer than estimated (Kumar et al., 2003). In an attempt to reduce the project budget, management conveys unrealistic project timelines by overlooking key implementation tasks; consequently, timelines are constantly readjusted to fit in previously ignored tasks, causing eventual project delays (Wong et al., 2005).

#### 2.18.3 The Root Cause of Incorrect Cost Estimations

High consultancy costs, training costs and revised project schedules are the main reasons recognised for budget escalations (Kumar et al., 2003). Consultancy costs can typically consume 30% of the implementation budget (Bingi et al., 1999) but can even rise to 70% of the total cost in particular projects (Kumar et al., 2003). These underlying costs are described as the hidden costs associated with an ERP system implementation, as a result of which many organisations face major cost uncertainties. The fact that organisations often have to incur additional hardware costs which have not been budgeted for is another commonly identified hidden cost (Kumar et al., 2003). Hidden costs are known to have a substantial increase on the implementation budget and can even subsequently account for implementation failures (Gargeya & Brady, 2005; Momoh et al., 2010).

Findings by Panorama Consulting Solutions (2015) cite scope overruns, and unanticipated organisational and technical challenges as the main reasons explaining why projects go over the allocated budget.

#### 2.18.4 Scope Creep and Lack of Planning

Scope creep is another key project management constraint faced by organisations, as either a broad or a narrow project scope can lead to severe schedule and cost overruns. Managing the scope of ERP projects is typically characterised as a complex endeavour (Chen et al.,

2009; Gargeya & Brady, 2005; Umble et al., 2003). Categorised as both a CSF and a CFF, managing project scope ranks as one of the most crucial activities of any ERP implementation (Gargeya & Brady, 2005; Soja, 2011; Somers & Nelson, 2001). A project scope is the blueprint of an implementation plan based on which the budgetary and resource needs are determined (Gargeya & Brady, 2005). The scope includes all the affected business processes and the different modules and tasks to be undertaken as part of the implementation project (Dezdar & Ainin, 2011a; Umble et al., 2003). Based on the scope of the project, a comprehensive plan is developed. Planning is closely associated with the maintenance of scope (Gargeya & Brady, 2005), as any additions to the project plan lead to scope creep, inherently increasing the implementation time and cost which, in turn, can lead to implementation failures (Davenport, 1998; Gargeya & Brady, 2005; Kim et al., 2005; Kumar et al., 2003; Somers & Nelson, 2001; Umble et al., 2003).

Many organisations have underestimated the complexity of planning an ERP system in the past (Gargeya & Brady, 2005). Planning an ERP implementation project is a confounding task, as it entails breaking down a large-scale project into smaller, more flexible and manageable units. A clear implementation plan arguably becomes a project manager's most significant concern. A well-defined project plan is critical in determining the required scope, budget, schedule and implementation risks to achieve the goals and objectives of the project (Bhatti, 2005; Sommers & Nelson, 2001; Chan 1999; Dezdar & Ainin, 2011b). Organisations without a clear implementation plan have performed poorly in the past as opposed to those who had a clear implementation plan (Mandal & Gunasekaran, 2003). Other project-planning activities include the setting up of teams, the planning of project milestones as well as reviewing the implementation strategy (Chan, 1999).

The impact of poor project scope and plan on an ERP project is discussed by Chen et al. (2009). A loose project scope and lack of a comprehensive plan result in scope creep, wrong assignment of resources, inadequate user requirements and mismanagement of critical requests. In their study, Mandal and Gunasekaran (2003) depict the significance of a clear implementation plan and its link to project success. The organisation-wide ERP implementation was broken down into natural phases and the plan incorporated over 1 500 separate activities with clear guidelines on the required tasks with their preferred order and durations. All key stakeholders were sent a detailed a plan of the implementation process with regular updates on the progress (Mandal & Gunasekaran, 2003). However, because of the complexity of an ERP project, planning naturally needs to be adjusted at different stages of the ERP implementation cycle with any necessary changes being addressed early enough to minimise and manage the impact on cost and schedule (Dezdar & Ainin, 2011a; Yusuf et al., 2004).

In addition to inadequate planning, an organisation's desire to maintain its existing business processes while modifying the ERP solution is another common cause of scope creep (Okrent & Vokurka, 2004). Standardising and mapping their business processes to match the ERP software is seen as a challenging task, leading to attempts of modifying the software to match their business needs (Chen et al., 2009; Okrent & Vokurka, 2004). Excessive customisation is highlighted as one of the major reasons accounting for scope creep, as

organisations continually struggle to determine the extent of required customisation. Excessive customisation is further discussed in section 2.24. Chen et al. (2009) further outlined how a poor project plan and loosely defined scope of an ERP vanilla approach led to numerous customisation requests from various business units. In their study, management succumbed to the pressure of the different units and attempted to customise the ERP solution, once more without carefully defining and planning the process. This poor project management practice led to further complications, with the ERP project exceeding both the planned budget and timeline.

## 2.19 Human Resource Impediments

Putting together a balanced, dedicated team comprising of the most experienced, most knowledgeable people from different functional units is key for a successful ERP implementation (Gargeya & Brady, 2005). An organisation's inability to build the right team due to shortage of required ERP skills that the assigned implementation team should possess is a noted critical human resource impediment. Employees in a balanced team should possess both business and technical expertise (Barker & Frolick, 2003; Chen et al., 2009; Gargeya & Brady, 2005; Kamhawi, 2008; Kim et al., 2005). In effect, organisations struggle to recognise the different qualities and skills that are required and to successfully acquire and integrate the different skills set and knowledge of people throughout the ERP lifecycle (Chan, 1999). As a result of management's failure to source critical IT skills due to the perceived lack of in-house skills, organisations have to increasingly rely on external consultants to fill in the experienced void (Chen et al., 2009).

While project team competence is ranked as one of the topmost CSFs by Somers and Nelson, (2004), Soja (2011) argues that a lack of personnel skills and knowledge is more frequently categorised as a critical challenge but seldom classified as a CSF. This is attributed to an organisation's tendency to assume, de facto, that adequate qualified resources will be allocated to the implementation project (Soja, 2011).

In their study, Barker and Frolick (2003) discuss the impact of a poorly selected ERP implementation team on the implementation outcome. The team selected by the organisation comprised mostly of new inexperienced people who had recently joined the organisation. The selected team did not have many ERP skills, nor did they have the expertise of business users. As a consequence, numerous challenges were encountered along the way which partially accounted for the eventual implementation failure (Barker & Frolick, 2003). Lending close support to the findings of Barker and Frolick, Chen et al. (2009) conclude that a lack of in-house skills and knowledge of the implementation team potentially leads to implementation chaos.

The lack of availability and commitment of qualified resources during the different stages of an ERP implementation poses another major problem to the organisation (Somers & Nelson, 2001). Prior research establishes the significance of ensuring that the assigned project team's dedication is solely on the ERP implementation. The project team should be freed from any other major responsibilities and participants cannot be expected to work under pressure for extended hours. Additionally, requiring the project team to work for prolonged

hours to meet unrealistic targets is more likely to lead to users' resistance and, consequently, an implementation failure (Barker & Frolick, 2003; Nah et al., 2003; Wong et al., 2005).

## 2.20 Lack of Top Management Support

Incontestably, one of the most significant challenges faced by organisations is ensuring top management's support and commitment throughout the implementation cycle. Lack of top management and unrealistic management expectations are cited as critical failure factors (Soja, 2011; Wong et al., 2005). While top management support is always rated as one of the most crucial factors contributing to a positive ERP implementation outcome (Ehie & Madsen, 2005; Soja, 2011), some studies, however, allude to lack of top management support and unrealistic management expectations as critical failure factors (Soja, 2011; Wong et al., 2005). Soja (2011) further highlights that lack of management's support and awareness is ranked as the fourth most crucial implementation impediment.

Ongoing senior management commitment plays a fundamental role in this entire implementation process, as it forms the basis of a successful implementation (Garg, 2010). In their study, Venugopal and Rao (2011) further advance that top management support needs to be emphasised and reinforced throughout the implementation cycle and be accompanied by affirmative actions. Their research explored two contrasting case studies; both cases appeared to have the required top management's support in the initial phase. However, top management's support and involvement started declining as soon the project had started in case one, whereas, in case two, management supported the implementation through real actions. In the latter case, both the president and chief financial officer (CFO) headed the project and played key roles in the review meetings, whereas the former was led by an IT project manager. The president and CFO of case two made constant re-emphasis of the importance of the implementation and a full-time user team was created with core users being given intensive training, amongst other key initiatives undertaken by the top management team. Consequently, the ERP implementation in case two was deemed successful and a failure in case one (Venugopal & Rao, 2011). The authors further emphasise that top management's role should be empowering and should be regarded more as a leadership construct. Similar thoughts were previously echoed by Sarker and Lee (2003). Through their case study, the authors note that leadership is a necessary condition for a successful ERP implementation outcome and that any ERP project should be characterised by a strong and committed leadership throughout the implementation cycle.

## 2.21 Integration Challenges

ERP systems were predominantly *"created on the value proposition of integration"* (Davenport et al., 2004, p.19). Contrary to existing beliefs, ERP systems do not provide integrated solutions. ERP systems should not be regarded as a solution to integration challenges, as, in actual fact, an ERP system *"amplifies the need for integration"* (Themistocleous, Irani, O'Keefe, & Paul, 2001, p.9) This claim is further substantiated by Davenport et al. (2004) who argue that implementing an ERP solution does not automatically guarantee full integration of an organisation's information and business



processes. Davenport et al. (2004) state that 42% of the surveyed organisations barely achieved any integration, despite their ERP implementation efforts.

Numerous studies report on the integration challenges faced by organisations during the ERP implementation lifecycle. Besides the centralisation of information across business units, other integration challenges include misalignment of business strategy with the IT solution, consolidation of different ERP system instances, integration of legacy systems and integration of disparate technologies (Alshaw, Themistocleous, & Almadani, 2004; Chen et al., 2009; Davenport et al., 2004; Kim et al., 2005; Themistocleous et al., 2001).

Strategies aiming to overcome this perceived limitation either opt to maintain use of the legacy solution, system configuration and/or to integrate add-on modules to the original ERP solution (Kumar et al., 2003). Through their survey, Kumar et al. (2003) disclose that firms may use concurrent strategies to address the perceived shortcomings of the ERP solution. While 65% of the surveyed organisations opted for system configuration, 50% developed add-ons. However, organisations may choose not to address this particular limitation as they continue their operations with the fundamental shortfall. 15% of the surveyed organisations did not address this particular limitation and chose to operate with the shortfall (Kumar et al., 2003). Others may choose to continue usage of their legacy systems in addition to the ERP system, leading to an inherent need of integration between the different systems (Kumar et al., 2003; Themistocleous & Irani, 2001). 38% of the surveyed organisations did not replace their legacy systems after their ERP implementations (Themistocleous & Irani, 2001).

Hence, the integration an ERP solution with legacy systems or other autonomous systems adds another level of complexity. Organisations struggle to achieve the desired level of integration as they categorise the integration attempts as complex, time-consuming and costly (Themistocleous et al., 2001) and an ongoing activity that lingers long after the core implementation has taken place (Davenport et al., 2004).

In their study, Chen et al. (2009) discuss the impact of misalignment between the business strategy and IT strategy. A lack of integration practices in the organisation led to management eventually succumbing to pressures from its different business units, leading to conflicting views amongst different stakeholders and the emergence of numerous unnecessary customisation requests (Chen et al., 2009; Kim et al., 2005).

## 2.22 Reengineering Challenges

An ERP system is a generic solution which requires an organisation to rethink its current way of operating (Davenport, 1998). Implementing an ERP system entails BPR to ensure standardisation and optimisation of an organisation's business processes in an attempt to reap maximum benefits through the use of the embedded best practices of the ERP solution (Bingi et al., 1999; Davenport et al., 2004). BPR has been amongst the top cited CSFs over the years (Finney & Corbett, 2007; Holland & Light, 1999; Nah et al., 2003; Ngai et al., 2008; Somers & Nelson, 2001). Soja (2011), however, presents a contrasting view. The surveyed Polish organisations rank BPR amongst the least significant CSFs, implying that organisations in the emerging world place less emphasis on BPR (Soja, 2011). Nonetheless, a lack of BPR is



also considered as a CFF (Amid, Moalagh, & Zare Ravasan, 2012; Hawari & Heeks, 2010; Umble et al., 2003; Wong et al., 2005).

Organisations assume that an ERP system is an easy solution to reengineer their processes so the latter are realigned and standardised to reflect best practices (Davenport et al., 2004). Nonetheless, only 40% of the organisations have managed to achieve the desired standardisation (Davenport, 1998). Realigning an organisation's business processes to that of an ERP system is known to be a daunting, time-consuming and costly process. In instances of company-wide and multinational roll-outs, organisations struggle to agree on one standardised process, predominantly when the uniqueness of the process is the driver for competitive advantage (Bingi et al., 1999).

Okrent and Vokurka (2004) present a three-phase process reengineering approach, also known as mapping analysis.

1. The first step entails the mapping of an organisation's AS-IS process to understand why and how operations are conducted. This process also allows organisations to identify their core processes, as well as the non-value-added processes which can later be eliminated.
2. In the second phase, organisations model their idealised critical processes while eliminating the non-value-added activities. At this stage, organisations can start involving ERP vendors to assess how their idealised critical processes can best be mapped to a particular solution.
3. The last phase simply looks into ensuring a smooth transition by locking the appropriate strategies to manage the implementation process.

While an organisation may even choose to reengineer their processes completely to adapt to the new best practice standard as embedded by the ERP system (Kumar et al., 2003), the underlying difficulty is that the proposed solution will not match the entire organisational needs (Davenport, 1998). The reality is that an ERP solution may lack core functionalities which are required to link all the required business processes of an enterprise (Kim et al., 2005; Kumar et al., 2003). Seventy seven per cent of organisations claim that an ERP system on its own is best described as an average solution to their problems, fulfilling only 30% to 50% of their business needs (Themistocleous et al., 2001).

Moreover, ERP consultants are notorious for not dedicating enough time and effort to BPR activities. They often lack the required knowledge to conduct the required activities, leading to incongruous process redesign solutions (Hawari & Heeks, 2010; Wong et al., 2005). Wong et al. (2005) explain the BPR impediments experienced by their four surveyed organisations. First of all, employees were uncertain on the relevance of BPR and their required contribution. Their participation remained limited. Consultants offered poor quality advice, offering time-consuming workarounds to cater for business process mismatches. Business processes were unsuccessfully redesigned due to the lack of mapping analysis. As a result, not only did the deployed solution include numerous configuration errors, but there was also a substantial mismatch between the required business functionalities and the functionalities provided by the ERP system. In one of the organisations, the mapping

analysis was deemed ineffective as it was carried out in a rush. The BPR documentation handed to the internal project team was incomplete, with the omission of core guidelines. Consequently, the team was unsure of how to adapt their business processes to match that of the ERP system.

Another noted challenge for organisations is to ensure that reengineering efforts do not focus solely on operational processes. Knowledge-based processes driving innovation such as marketing, new product development, strategic planning and management should be redesigned as well (Davenport et al., 2004). Furthermore, due to the constant environmental and technological changes, BPR needs to be perceived as an ongoing process whereby organisations undertake reengineering activities every three to five years (Okrent & Vokurka, 2004).

### 2.23 Lack of Cross-Functional Coordination

Adequate functional coordination is regarded as one the key challenges faced by organisations, as lack of coordination amongst different business units and stakeholders is often cited as one of the factors leading to implementation delays and organisational conflicts, eventually leading to implementation failure (Kim et al., 2005). Conflict of interest between different functional units and a lack of resource commitment are highlighted as critical challenges linked to implementation failure (Kim et al., 2005).

### 2.24 Excessive ERP Software Customisation

One of the underlying difficulties faced by organisations implementing ERP systems is the fact that all their organisational needs are not fully met by the proposed solution. Organisations seek to address this gap by either opting for system configuration, developing add-on modules or, in some cases, organisations may even choose to reengineer their processes completely to adapt to the new ERP system (Kumar et al., 2003).

Customisation refers to the amendment of an ERP system to match an organisation's existing business process. An ERP system is perceived to be "*adaptable*" but not "*malleable*" (Chung & Synder, 2000, as cited by Yusuf et al., 2004). When implementing an ERP system, organisations are faced with the constant dilemma of whether to realign their business processes to match that of an ERP system or to modify the functionalities of an ERP system to match their business process. The latter is only recommended when organisations cannot change an existing business process as it forms the basis of competitive advantage for the organisation.

An ERP system is a generic solution which requires an organisation to rethink its current way of operating (Davenport, 1998). Although some degree of ERP customisation is required to adapt the ERP solution to the organisational needs (Rothenberger & Srite, 2009), excessive modification results in unnecessary complexity, high incurred costs, an increasing number of unwanted bugs, difficulties in upgrading and maintaining the system, and a longer implementation period (Bingi et al., 1999; Chuang & Shaw, 2008; Davenport, 1998; Kim et al., 2005; Kumar et al., 2003; Momoh et al., 2010), to the extent of dampening the project's

success (Rothenberger & Srite, 2009). Numerous studies have linked excessive customisation to project implementation failures (Kim et al., 2005; Momoh et al., 2010).

In their study focusing on ERP implementation and reasons accounting for customisation, Rothenberger and Srite (2009) present a three-tier model depicting the determinants influencing the customisation outcome.

Pre-project characteristics include ERP knowledge at the beginning of the project, organisational project motivation and organisational culture. The identified project characteristics are classified as experience of the implementation team, reliance on consultants, ERP project acceptance and fear of personal disadvantage from change. The three determinants which are shown to have a direct influence on the levels of customisation are categorised as duplicate implementation of existing functionality, the implementation team's determination to avoid customisation, and resistance to change.

The relationships between pre-project characteristics, project characteristics and determinants influencing the outcome of an ERP system customisation are depicted in Figure 2-6. The outcome can result in excessive customisation or minimal customisation. Key relationships between project characteristics and ERP system customisation are discussed (Rothenberger & Srite, 2009).

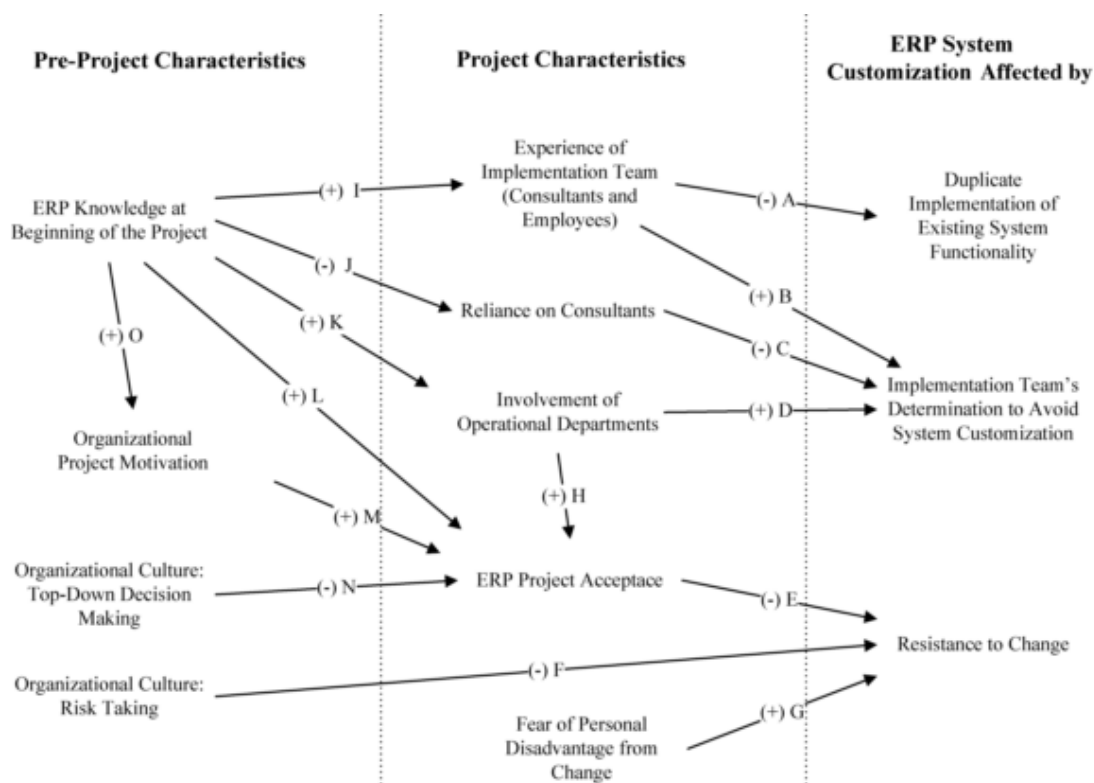


Figure 2-6: The Relationship Between Pre-Project Characteristics, Project Characteristics and Determinants of Customisation (Rothenberger & Srite, 2009)

## 2.25 Inadequate System Testing

Ensuring that the ERP system is adequately tested is a difficult task (Markus et al., 2000). Testing an ERP system is perceived as a resource intensive and daunting task (Yusuf et al.,

2004). Moreover, apprehensions of missing unrealistically scheduled ERP implementation deadlines often result in organisations' reservations in the allocation of adequate resources towards testing activities. In truth though, dedicating enough time to this activity ensures red flags are picked up and fixed before the go-live date (Gargeya & Brady, 2005). However, testing is not perceived as a primary value-added activity in organisations and its significance is often overlooked. As noted by Kumar et al. (2003), not all organisations engage in testing activities. Half of the surveyed organisations in their study engaged in some unit testing, while 38% performed some integration testing and some type of pilot testing, with only 25% of the sample executing any scalability and performance testing. Furthermore, organisations struggle to clearly delineate the different testing phases as tasks often overlap. Yusuf et al. (2004) establish that testing activities between unit, integration and user acceptance testing are increasingly complex and blurred.

System testing is categorised as a CSF by numerous studies (Holland & Light, 1999; Nah et al., 2001, 2003; Somers & Nelson, 2001), while inadequate testing is considered as a critical failure factor (Wong et al., 2005). Through their study, Gargeya and Brady (2005) highlight numerous case studies to provide insights on the significance of adequate testing. While both Gillette and Kodak companies recognised rigorous testing as one of their primary success factors, Whirlpool Corporation acknowledged their blunder of not allocating sufficient time to fix the identified bugs before their go-live period, resulting in implementation horrors costing the company much more in the long run (Colette, 1999, as cited by Gargeya & Brady, 2005). These claims are supported by Wong et al. (2005). Due to the unrealistic time pressures, testing was rushed and of poor quality, contributing to the implementation failure in three of the four surveyed organisations. The implementation team could not solve all the unveiled challenges before the go-live date. The unresolved problems could not be fixed after the go-live date as the team claimed the problems were more complicated than anticipated. Furthermore, Wong et al. (2005) associate a lack of knowledge to the poor quality of testing. The project team seldom has the required competence and skills to adequately test the ERP systems.

## 2.26 Software Misfit

A misfit is described as the gap between the functionality provided by the ERP software and the functionality required by the organisation (Soh et al., 2000). Soh et al. (2000) describe three type of misfits, namely, data, functional and output. Data misfits refer to technical shortcomings of the system with respect to the limitations of the data model or the required data format and accuracy. Resolving data misfits is a complex undertaking as it usually involves modification of an ERP system's structure and table objects. These modifications are not recommended as they require massive development efforts and specialised skills and might even lead to unanticipated future software difficulties during upgrades (Rothenberger & Srite, 2009; Soh et al., 2000).

Functional misfits denote the functional gaps of the ERP system where dominant existing functionalities of the legacy system cease to exist (Soh et al., 2000). The lack of functionality to support business processes is cited as a common challenge faced by all organisations (Kim et al., 2005). In one study on the implementation of a SAP module by the Australian Water

Corporation, the lack of key functionalities as a result of the implementation led to situations where time-consuming manual workarounds were required. Consequently, the SAP solution was marginally used as the scheduling module was not deemed adequate to deal with the requirements of the organisation (Mandal & Gunasekaran, 2003).

Categorised as the most common type of misfit, output misfits reflect the limitations of the ERP system in terms of the organisation's required presentation format and information content. For instance, compulsory reports do not convey the required information in the recommended format (Chen et al., 2009; Sheu et al., 2004; Soh et al., 2000). Moreover, the reports cannot be easily manipulated without extensive programming required and the reporting interface becoming increasingly complex to understand (Hong & Kim, 2002). Consequently, ERP users struggle to manipulate data stored in the ERP system to the required formats while producing timely management reports (Yusuf et al., 2004).

ERP software misfit are categorised as a CFF (Soja, 2011; Wong et al., 2005). Implemented ERP solutions that do not align with the core business requirements often result in limited usage of the solutions (Wong et al., 2005). Wong et al. (2005) made the inference by observing a similar pattern in 75% of their surveyed organisations. A poor selection of the ERP software implies that core business activities cannot be completed, consequently leading to an increasingly high number of workarounds. In an attempt to overcome the software limitations, the implementation team invests heavily on modifying the software, which results in further complications.

Challenges related to software misfit are inherently found to be more prominent in the developing world as compared to developed countries. This is attributed to the embodiment of the western practices and culture in the ERP software (Rajapakse & Seddon, 2005; Shiang-yen, 2011; Soh et al., 2000; Soja, 2011).

## 2.27 Environment Misfit

Extending Soh et al. (2000) misfits model, Shiang-yen (2011) proposes a system environment misfit. A system environment misfit encompasses missing system quality and poor performance, incompatible IT infrastructure and poor usability by target user groups. System quality in this context refers to the required security features, back-up capability and reliability and flexibility of the ERP system (Shiang-yen, 2011). Poor system performance and incompatible IT infrastructure are discussed below.

### 2.27.1 Poor System Performance

Limitations, directly related to the ERP solution's performance, surface, most times, in the post-implementation stage. Slow system performance, a lack of responsiveness of the system and system unavailability become some of the underlying challenges experienced by end-users (Kumar et al., 2003; Lee, 2008; Yusuf et al., 2004). Slow response time of the system and system unavailability due to network failures are categorised as significant end-user concerns (Lee, 2008). The nature of an ERP system requires 100% network reliability in order to enable end-users to carry out their business processes without unnecessary interruption. System unavailability due to network failures, as an example, might bring the organisation to a complete standstill (Kumar et al., 2003).

### 2.27.2 Incompatible Infrastructure and Network Failures

Little emphasis is placed on hardware and technological requirements in organisations, which results in organisations largely underestimating the budgets with regard to these requirements, leading to a large proportion of the hidden costs, as discussed in section 2.18. The ERP solutions deployed are mostly incompatible with existing infrastructure, as a result of which organisations have to invest heavily to redesign and deploy a new infrastructure. Moreover, the rapidly evolving business environment results in an organisation's constant adaptation to the supporting IT environment, implying that organisations have to keep upgrading their infrastructure in order for the ERP solution to operate at an optimal level (Kumar et al., 2003; Momoh et al., 2010). In their study, Kumar et al. (2003) unveil that 15% of their surveyed organisations experienced some infrastructure-related incompatibilities with their newly deployed systems.

Though organisations do not perceive system infrastructure as a CSF (Ehie & Madsen, 2005; Soja, 2011), few studies categorise poor infrastructure as a significant CFF (Soja, 2011; Wong et al., 2005). Arguably, poor IT infrastructure is a more prevalent challenge in developing countries as compared to the developed world, as numerous studies conducted in developing countries have attributed the low ERP adoption rate to infrastructure challenges (Huang & Palvia, 2001; Rajapakse & Seddon, 2005; Soja, 2011).

## 2.28 Data Quality Challenges

Data quality is defined as data which is suitable for use by data consumers along the dimensions of accuracy, timeliness, completeness and consistency (Ballou & Pazer, 1987, as cited by Xu et al., 2002). Data quality is of paramount importance to the success of an ERP implementation. Poor data quality can lead to undesirable effects within an organisation and, eventually, adversely impact the competitiveness of an organisation (Umble et al., 2003; Xu et al., 2002; Zhang et al., 2005).

Data quality has consistently been cited as both a CSF and a CFF (Amid et al., 2012; Somers & Nelson, 2004; Umble et al., 2003; Zhang et al., 2005). For an enterprise system to function effectively, data should be both accurate and complete and readily available when required (Somers & Nelson, 2004). Umble et al. (2003) lay emphasis on the criticality of accurate data for an ERP system to function effectively. Owing to the integrated nature of ERP, a wrong data entry can have a negative domino effect throughout the entire enterprise.

Converting historical data to the required new format is seen as another daunting data-related challenge, as organisations are known to have multiple sources of historical data. Moreover, historical data is frequently incomplete and inaccessible, due to multiple interfaces, varying formats and security procedures (Xu et al., 2002). Consequently, organisations are known to have implemented costly data retrieval procedures in an attempt to recover key data from the legacy system (Yusuf et al., 2004). Nevertheless, reconciliation of data between the legacy and the new system often leads to data inconsistencies and corruption, leading to ERP implementation disasters (Xu et al., 2002; Yusuf et al., 2004). Most of the underlined ERP software challenges refer to inaccurate data and bugs in the system (Kumar et al., 2003; Lee, 2008; Yusuf et al., 2004). The majority of

data inconsistencies are unfortunately only detected once data has been migrated to the new system, as organisations often omit to incorporate necessary data control measures before the migration. Organisations attribute the high cost of data control measures to the lack of appropriate data quality measures in place. As noted by Kumar et al. (2003), a mere 20% of the sample engaged their key business users to validate the new extensive organisational data (Kumar et al., 2003).

Yusuf et al. (2004) outline the overwhelming experience of the core implementation team during the data migration phase. Numerous data challenges such as wrong user authorisations, incorrect input data and transactional data were noted after the initial migration exercise. Consequently, organisations are compelled to use both their historical and ERP system for a large period of time until the data challenges are solved (Kumar et al., 2003; Lee, 2008; Yusuf et al., 2004). The data clean-up exercises are deemed to be resource-intensive as organisations are obliged to dedicate enough time, budget and resources to ensure the eventual safekeeping of the data integrity.

### Strategies Used to Overcome Data Quality Challenges

Organisations ought to ensure that their employees are adequately educated on the right data entry procedures. Users need to be convinced and dedicated to the new system to use it suitably. Legacy and bespoke parallel systems need to be phased out to ensure commitment to the new system (Umble et al., 2003). Adequate training and communication, top management support and data quality controls are some of the factors influencing the level of data quality (Xu et al., 2002). Training ensures that end-users are aware of the importance of data quality and use the system as required. Proper communication channels ensure a shared understanding of the data requirements and usage amongst different sets of stakeholders. Support from top management is crucial to allocate adequate budget and resources, in order to implement strategies to overcome any data quality challenges experienced. Data quality controls before the migration of old data to the new system should be undertaken to unveil any data anomaly (Xu et al., 2002).

## 2.29 Cultural Challenges

### 2.29.1 National Culture

Multinational ERP implementations bring an additional level of complexity to organisations. National dilemmas due to differences in language, culture, politics, government regulations and business practices arise when implementing ERP systems in different countries (Sheu et al., 2004). Cultural challenges may lead to the failure of ERP systems if not managed properly (Xue et al., 2005). Through their study, Xue et al. (2005) assert that cultural challenges have a significant impact on the failure of different ERP systems in China.

Arguably, language becomes a crucial challenge when ERP systems are implemented in countries where English is not the de facto language (Davison, 2002; Sheu et al., 2004; Soh et al., 2000; Xue et al., 2005). For instance, the Chinese language provides an ideal illustration of the challenges involved. The use of homonyms as well as shapes and figures to denote words, renders translation from English to Chinese a complex task. The poor quality of translation adds to the confusion of the users and causes numerous technical



malfunctions which negatively impact the ERP implementation outcome (Davison, 2002; Xue et al., 2005).

Numerous studies discuss the fundamental cultural differences existing between different nations due to which business practices are often dissimilar (Davison, 2002; Rajapakse & Seddon, 2005; Sheu et al., 2004; Soh et al., 2000; Xue et al., 2005). One of the underlying reasons explaining the national cultural barriers faced by organisations refers to the fact that ERP systems predominantly embody European and American organisational processes and practices, as they are conceptualised and designed by western professionals. Consequently, ERP systems typically reflect the western national and organisational cultures (Davison, 2002; Rajapakse & Seddon, 2005; Soh et al., 2000). For instance, while the Chinese culture is represented by paternalism, personalism and high context communication, the western culture offers a contrasting view with individualism, impersonalism and formal communications (Martinsons & Westwood, 1997). These differences inevitably pose an additional level of complexity, negatively impacting implementation of ERP systems in developing countries.

Implementing ERP systems in different nations with diverse contextual conditions results in different types of misfits, as projected in section 2.26 (Soh et al., 2000). These gaps occur due to company-specific, public-sector-specific or country-specific requirements which are incompatible with the capabilities of the ERP system. Company-specific requirements arise due to differences in organisational structure, management style and legacy procedures. Public-sector requirements refer to unique reporting requirements, whereas country-specific requirements reflect the unique social practices and culture which vary from country to country (Sheu et al., 2004; Soh et al., 2000; Xue et al., 2005).

Despite the prominence of various cultural models in the literature, IS literature mainly focusses on Hofstede's theory of cultural dimension (Myers & Tan, 2002). Similarly, a number of studies use Hofstede's theory to explain the impact of differing cultures on ERP implementations (Palomino Murcia & Whitley, 2007; Rajapakse & Seddon, 2005; Shanks et al., 2000). Hofstede's theory categorises culture in terms of power distance, individualism/collectivism, uncertainty avoidance and masculinity/femininity. Power distance relates to the measure of interpersonal power between two individuals, while uncertainty avoidance is characterised by the extent to which individuals feel threatened by an ambiguous situation. Individualism is regarded as mostly caring for oneself, as opposed to collectivism being caring for oneself as well as others. Lastly, masculinity/femininity is the extent to which dominance is used and perceived in a society (Palomino Murcia & Whitley, 2007; Rajapakse & Seddon, 2005; Shanks et al., 2000).

In the context of ERP implementations, the applicable dimensions accounting for national cultural disparities focus mainly on power distance, individualism/collectivism and uncertainty avoidance. Past literature establishes that countries with a high power distance are bound to face more conflicts during an ERP implementation, as opposed to those with a lower power distance. Similarly, countries demonstrating high levels of uncertainty avoidance and collectivism are less likely to take on additional responsibilities, accept new



technologies and change, when compared to their opposing counterparts (Palomino Murcia & Whitley, 2007; Rajapakse & Seddon, 2005).

Through their study, Rajapakse and Seddon (2005) account Sri Lanka's high power distance and low individualism, as one of the primary reasons for the low ERP adoption rates in the country. These findings are supported by Palomino-Murcia and Whitley (2007) who delineate the disparities in power distance and uncertainty avoidance between Columbia and Switzerland as the reasons accounting for the low ERP penetration in Columbia as opposed to Switzerland. Similar to Sri Lanka, Columbia shows a high level of uncertainty avoidance and high power distance characterised by high bureaucracy and complex processes, as compared to their European counterpart. Their study, however, reveals that the differences between an individualist versus a collectivist culture between Switzerland and Columbia do not account for major implications towards the implementation of an ERP system (Palomino Murcia & Whitley, 2007).

### 2.29.2 Organisational Culture

Organisational culture is defined as a set of shared assumptions and understanding reflecting an organisation's way of functioning (Deshpande, Frederick, & Webster, 1989). Organisational culture refers to the sets of beliefs and underlying assumptions providing employees with a common base of reference (Schein, 1990). Every organisation has its unique set of beliefs and practices, influencing the way employees think and behave. Implementing an ERP system can challenge employees' existing beliefs, leading to a disparity between the existing organisational culture and the culture embedded in the ERP system. Consequently, employees might be resistant to change, ultimately leading to failure to adopt the ERP system (Ke & Wei, 2008). Therefore, organisations are recommended to invest substantially in order to understand and reengineer their processes to remove any procedural and cultural idiosyncrasies prior to implementing an ERP system (Gargeya & Brady, 2005; Sedera et al., 2003).

## 2.30 Knowledge Challenges

Knowledge exists internally within the employees of the organisation, or externally with the consultants and vendors. Internal knowledge is unique, specific and tacit, predominantly embedded in "*behaviours, procedures and the ERP software*" (Sedera et al., 2003, p.1411), whereas external knowledge brings a different outlook to the organisation. While both internal and external knowledge influence the outcome of an ERP success, internal knowledge shows a stronger correlation to ERP success (Sedera et al., 2003). A number of studies emphasise the importance of managing knowledge during the ERP implementation process (Davenport, 1998; Markus et al., 2000; Sedera & Gable, 2010).

Managing ERP knowledge is, however, perceived as a difficult task, since an ERP system includes numerous stakeholders spanning across and beyond organisations and includes various functionalities and capabilities (Sedera et al., 2003). A number of challenges hindering proper diffusion of knowledge during the ERP implementation phase are highlighted (Pan, Huang, Newell, Wan, & Cheung, 2001). They are:

**Knowledge Is Embedded in Complex Organisational Processes**

ERP systems' capabilities and functionalities span different departments involving many internal and external users, leading to a diversity of interests and competencies in specific knowledge areas. The key challenge is to overcome any conflicting interest to integrate knowledge in order to promote standardisation and transparency.

### **Knowledge Is Embedded in Legacy Systems**

Users are reluctant to use the new systems, constantly comparing the capabilities of the new systems to legacy systems. This is a prevalent mind-set which needs to be anticipated. The ERP system needs to look seemingly similar to the legacy system through customisation which can be achieved by *"integrating knowledge through mapping of the information, processes, and routines of the legacy system into the ERP systems with the use of conversion templates"* (Pan et al., 2001, p.414).

### **Knowledge Is Embedded in Externally Based Processes**

ERP systems link external systems to internal ones; as a result, external knowledge from suppliers and consultants needs to be integrated into the system. This can be a time-consuming process and the implementation team needs to ensure that essential knowledge is integrated from the initial implementation phases through personal and working relationships.

Other identified knowledge impediments include configuration and assimilation knowledge (Onofrei et al., 2004). The assimilation knowledge gap refers to the difficulty encountered by employees to understand the ERP system, while configuration knowledge gap is the lack of required expertise to configure an ERP system to match the organisational needs. Configuration challenges can be overcome by nurturing a strong core implementation and fostering strong consultant relationships, while assimilation knowledge can be addressed through training and education. Assimilation knowledge gap is, however, an ongoing challenge experienced by organisations and the gap is amplified by employees' lack of process and technical knowledge. Inadequate employees' knowledge has been labelled as a CFF (Soja, 2011).

Knowledge transfer from consultants to the organisation's employees is another widely cited knowledge challenge and is identified as a CFF (Wong et al., 2005). Ineffective knowledge transfer mechanisms are cited as negatively influencing the ERP implementation outcome. Reluctance of consultants to transfer the knowledge to employees, ineffective training and communication, reluctance of employees to accept the knowledge, and lack of employees' absorptive and retentive capacity may hinder the knowledge transfer from outside consultants to the organisation (Volkoff, Elmes, & Strong, 2004). One of the most common ways to overcome this challenge is through the reliance on training and education to ensure that external knowledge ultimately resides within their organisation (Somers & Nelson, 2001). Use of consultants in ERP implementations is known to be a common source of conflict, as employees feel that consultants do not pass on their knowledge, have a tendency to take over the project and communicate badly (Skok & Legge, 2002). Jarvenpaa and Staples (2001) recommend that organisations should not overuse consultants and

should incorporate mechanisms and processes to manage and transfer consultants' knowledge back to the organisation.

### 2.31 Systemic Relationships of ERP Implementation Variables

Akkermans and van Helden (2002) have scrutinised the ERP implementation process, using a systems approach. The aim was to identify the interrelations of the different CSFs and explain the events that led to an ERP implementation's crisis. The research points out that, in effect, CSFs should not be viewed in isolation and that CSFs are *"causally linked in such a way that they reinforce each other in the same direction"* (Akkermans & van Helden, 2002, p.44).

Alas, following Akkermans and van Helden's research, few studies have forayed into analysing the interrelationships between the different ERP implementation variables. The emphasis of most studies remains on selected aspects of the implementation as opposed to focusing on the overall picture, resulting in numerous debates and calls for scholars to adopt a holistic view of the implementation process (Ngai et al., 2008; Venugopal & Rao, 2011).

### 2.32 Summary of the Literature

Implementing an ERP system is seen as a daunting task. ERP implementations are plagued with a high failure rate, hence a number of studies investigating the reasons of failure. This has led to a large section of the literature focusing on factor research. A number of studies focused on identifying and categorising either implementation CSFs, CFFs or challenges. Arguably, most of the implementation challenges discussed in the literature are based on the CSF and CFF literature. This literature reports on a comprehensive review of implementation challenges organisations face when implementing an ERP system. Organisations have continuously underestimated the impact of organisational change and user resistance. The role of top management in ERP implementations cannot be overlooked as ERP implementations require ongoing top management support, manifested through real actions. With statistics showing more than half of ERP projects going over time and budget, both time and cost are crucial elements of project management and need to be carefully assessed. Additionally, the time required to implement an ERP system varies according to the complexity and extent of the organisation's business processes. Other noted challenges include excessive customisation, software misfits, inadequate training and user involvement, and a lack of communication. Integration, reengineering and cross-functional challenges should not be overlooked by organisations.

### 2.33 Literature Gaps

Although several prior studies have endeavoured to investigate the CSFs and CFFs, the failure rate of ERP systems remains high. The fact that organisations underestimate the complexity of an implementation and do not have the required holistic understanding of the process can be considered as one of the foremost reasons why ERP implementations fail. As such, organisations are bound to face numerous challenges during their implementation projects. While a few prior studies have identified the challenges which can plague ERP implementations, the challenges remain fragmented, without clear delineations. A

comprehensive taxonomy to group the different ERP implementation challenges remains to be established. Additionally, while the majority of implementation studies focus on private sectors, implementation challenges faced by public organisations are scarce. Scholars stress that the implementation process in a public organisation is likely to be more complex and challenging; hence, lessons from such implementations should form an integral component of the ERP implementation literature.

Moreover, as emphasised by scholars, identifying and understanding the challenges are not sufficient to overcome the implementation challenges. There is a need to understand the different coping mechanisms which organisations can deploy to address the ensuing challenges. To date, there is limited knowledge of the coping mechanisms which organisations can deploy when implementing ERP systems. Barring the few studies which outline implementation strategies to overcome ERP challenges, there is a shortage of adequate research focusing on this particular aspect of literature.

As discussed in the above literature review, most of the factor research focuses on producing static, laundry lists of variables. The many variations of CSFs and CFFs led to researchers questioning their validity. The criticality of these factors has been probed in numerous studies, as ERP implementation failures have been on the rise despite the prominence of CSF and CFF knowledge. Moreover, ERP implementation is a dynamic process and the need is not only to understand the different challenges organisations face at different stages of the lifecycle, but, also to comprehend how the different challenges interact with each other to influence the implementation outcome.

A limited number of studies have been conducted in developing countries as compared to the developed world; even less so, in an African emerging context. None of the meta-analysis scrutinising the literature over the last decade makes any mention of the African context. This is attributed to the fact that ERP implementation studies conducted on the African soil, including South Africa, in the context of large organisations, have been limited, despite the worldwide increase in the implementation of ERP systems. Although this literature review identifies a few studies conducted in South Africa, none of them has studied the challenges faced by large organisations from a systemic perspective. Scholars have called for an in-depth analysis of ERP implementation cases in developing and emerging contexts to better understand the similarities and differences between developed and developing countries.

### 3 Research Methodology

This chapter describes the theoretical assumptions underpinning this research. The different research philosophies, theories, approaches, data, strategies and techniques are discussed. Each section includes a justification for the chosen approach specific to this study. The data collection and analysis procedures and an insight into the organisational context of the case organisation then follow.

#### 3.1 Revisiting the Research Questions

Following literature gaps discussed in section 2.33 , this research aims to examine the ERP implementation process in a large, decentralised, public organisation in South Africa, while adopting a holistic view to analyse the ERP implementation challenges and coping mechanisms. The following research questions are formulated

- RQ1: What are the major challenges faced by public organisations when implementing an ERP system?
- RQ2: How do the ERP implementation challenges interact with each other from a systemic perspective?
- RQ3: How can organisations overcome their ERP implementation challenges through the use of coping mechanisms?

#### 3.2 Detailed Research objectives

The study starts by unveiling and explaining the ERP implementation challenges. A systemic analysis of the ERP implementation challenges is then presented. Another core research objective is to explain how ERP implementation challenges can be managed through the use of coping mechanisms.

The following detailed research objectives are derived:

1. Identify the ERP implementation challenges faced by public organisations during their implementation process.
2. Assess the similarities and differences between the selected cases.
3. Provide a comprehensive taxonomy to classify the unveiled challenges.
4. Identify the dominant relationships between the unveiled ERP implementation challenges through co-occurrence analysis.
5. Develop a causal model to portray the systemic interplay of the ERP implementation challenges.
6. Identify the dominant feedback loops through the use of causal loop modelling.
7. Identify the coping mechanisms used by organisations to overcome their ERP implementation challenges.
8. Assess the impact of the coping mechanisms on the unveiled implementation challenges.
9. Generalise the findings to form theoretical propositions in order to draw research implications.

### 3.3 Philosophical Assumptions

Literature recognises three dominant research philosophies used to conduct social science, namely, positivist, interpretive and critical paradigms (Chen & Hirschheim, 2004; Liu & Myers, 2011; Orlikowski & Baroudi, 1991). The underlying assumptions, merits and weaknesses of each philosophy as acknowledged by the literature are summed up in the following sections.

#### 3.3.1 Positivist Research

The basic ontological assumption relates to the existence of an objective physical and social reality whose nature can be *“apprehended, characterised, and measured”* (Orlikowski & Baroudi, 1991, p.10). An independent relationship between the researcher and the object of inquiry exists with a distinct differentiation between theory and practice (Baroudi & Orlikowski, 1990). IS research is categorised as positivistic in cases where there is evidence of formal propositions, quantifiable relationships between variables which can be identified and tested through hypotheses testing, and when inferences can be drawn about a phenomenon from the representative sample.

As such, positivism assumes that reality exists independently and denies the element of human interaction in the making of the physical or social reality. The implication of this stance suggests that a single omni-reality exists and that the researcher’s aim is to uncover the underlying relationships and mechanisms through emphasis on validity and control of research procedures. One of the main criticisms of such a stance in research is its interpretation of causal relationships. Positivistic researchers assume that individuals do not influence their social reality, that the researcher is independent of the research context and that the attempt is to validate existing relationships (Baroudi & Orlikowski, 1990).

#### 3.3.2 Interpretive Research

The underlying ontological belief of an interpretive research approach is based on the thought that *“reality is socially constructed”* (Orlikowski & Baroudi, 1991, p.16). Social systems do not exist independently of humans as the social world is shaped and defined by humans through their actions and interactions. Interpretive studies are based on second-order constructs which relate to the researcher’s interpretation of interviewees’ constructions, known as first-order constructs (Walsham, 1995). Social actors have their own, unique understanding of the world.

Appreciating the uniqueness of the context is vital, as the essence of interpretive research is to produce *“an understanding of the context of Information System, and the process whereby Information System influences or is influenced by its context”* (Walsham, 1993, p.3-4). Walsham defines context within an IS as the organisation from a holistic viewpoint, the social structures within, as well as the consciousness of the different stakeholders associated with the system. Stakeholders include users of the systems, designers or any human actors affected by the system. Context is defined as *“the multi-level identification of the various systems and structures within which the Information System is embedded”* (Walsham, 1993, p.10-11).

The epistemological belief is that social processes cannot be captured and measured through the use of hypothesis testing and quantifiable relationships. Social reality can only be interpreted through languages, practices and the meanings assigned by social actors (Baroudi & Orlikowski, 1990). An interpretive epistemology has emerged as a well-established research paradigm in IS research (Walsham, 2006), allowing researchers to understand the cognitive behaviour and actions of humans in social and organisational contexts (Klein & Myers, 1999).

### 3.3.3 Critical Research

The third form of philosophical stance is that of critical research. The ontological assumption of a critical research philosophy is to unveil the restraining and alienating conditions of the status quo, thereby instigating change in existing social relations and practices (Baroudi & Orlikowski, 1990).

*“Critical researchers assume that social reality is historically constituted and that it is produced and reproduced by people” (Myers, 1997; p.241).*

Critical research explicitly reports on the dynamics of *“social issues such as freedom, power, social control, and values with respect to the development, use, and impact of information technology”* (Myers & Klein, 2011; p.17).

### 3.3.4 Stance

This research uses an interpretive paradigm. An interpretive paradigm is deemed suitable since the research seeks to explore and understand the perceptions and complex nature of the interactions between different stakeholder groups involved in an ERP implementation, while attempting to derive rich insights of the phenomenon based on second-order interpretations. The contextual settings of this study form a crucial element, as the research is set out in a large, decentralised, public sector organisation in an African emerging economy. Therefore, the actions and interactions of the social actors in this context are believed to be distinct. As such, viewing the organisation as a whole, whilst taking into consideration the social structures and the minds of the human participants involved with the system and any of those affected by the system becomes essential. Moreover, the focus of this research is not on theory testing or on developing an objective and static description of factor variables leading to implementation success or failure. Rather, the emphasis is on the understanding of the complex realities of social actors through their lived experiences to develop a context-based rich description of the ERP implementation challenges faced by different stakeholders and the different mechanisms employed to cope with the challenges.

## 3.4 Research Theory

The nature of theory in IS research has been a subject of much debate amongst scholars. While some argue that the focus of IS research should mainly be on theory testing, others assert that emphasis should be laid on theory development (Weber, 2003, as cited by, Gregor, 2006). A comprehensive definition of a theory is provided by Sutton and Staw (1995).

*“Theories emphasise the nature of causal relationships, identifying what comes first as well as the timing of such events. Strong theories delve into underlying processes so as to understand the systematic reasons for a particular occurrence or non-occurrence. It often burrows deeply into microprocesses, laterally into neighbouring concepts, or in an upward direction, tying itself to broader social phenomena. It usually is laced with a set of convincing and logically interconnected arguments. It can have implications that we have not seen with our naked (or theoretically unassisted) eye. It may have implications that run counter to our common sense” (Sutton & Staw, 2016, p.378).*

Gregor (2006) describes theories as:

*“abstract entities that aim to describe, explain and enhance understanding of the world, and in some cases, to provide predictions of what will happen in the future and to give a basis for intervention and action” (Gregor, 2006, p.616).*

Abstraction and generalisation, interactions and causation form the fundamental features of a good theory (Gregor, 2006; Sutton & Saw, 1995). Despite the call for theory development, Gregor (2006) queries the lack of definition of what constitutes a good theory and the lack of clarity on the different types of knowledge claims of a theory. To address these limitations, Gregor (2006) proposes four main categories of primary knowledge claims: analysis and description, explanation, prediction and prescription. A brief description of each knowledge claim is provided in Table 3-1.

*Table 3-1: Primary Goals of Theory (Gregor, 2006)*

Knowledge Claims	Explanation
<b>Analysis and Description</b>	To provide a rich description of the phenomena of study
<b>Explanation</b>	To provide richer insights on the phenomena through use of causality and argumentation
<b>Prediction</b>	To predict future outcomes under key pre-conditions
<b>Prescription</b>	A set of guidelines which, when acted upon, leads to the formation of a particular type of artefact

Based on the proposed knowledge claims, a taxonomy of five interrelated types of IS theories is derived. Table 3-2 depicts the five types of theory with their distinctive features. However, Gregor (2006) cautions that assigning a theory under a particular class might not be a very straightforward decision due to the overlapping characteristics and interrelations.

*Table 3-2: A Taxonomy of Theory Types in IS Research (Gregor, 2006)*

Theory Type	Distinguishing Feature
<b>Analysis</b>	Says what is The theory does not extend beyond analysis and description.



Theory Type	Distinguishing Feature
	No causal relationships among phenomena
<b>Explanation</b>	Says what is, how, why, when and where The theory provides explanations but does not aim to predict with any precision. There are no testable propositions.
<b>Prediction</b>	Says what is and what will be The theory provides predictions and has testable propositions but does not have well-developed justificatory causal relationships.
<b>Explanation and prediction (EP)</b>	Says what is and what will be The theory provides predictions and has both testable propositions and causal explanations.
<b>Design and action</b>	Says how to do something The theory gives explicit prescriptions (e.g., methods, techniques, principles of form and function) for constructing an artefact.

Gregor (2006) further lists four components essential to the five types of theory along with the components which are conditional, based on the purpose of the theory. Means of representation, constructs, statements of relationship and scope form the fundamental elements of any theory, as opposed to causal explanations, testable propositions and prescriptive statements which are dependent on the purpose of the theory (Gregor, 2006). Table 3-3 provides an overview of the essential components of a theory.

*Table 3-3: Structural Components of Theory (Gregor, 2006 p.620).*

Components Common to All Theory	Theory Component	Definition
	Means of representation	The theory must be represented physically in some way: in words, mathematical terms, symbolic logic, diagrams, tables or graphically. Additional aids for representation could include pictures, models or prototype systems.
	Constructs	These refer to the phenomena of interest in the theory. All of the primary constructs of the theory should be well defined.
	Statements of relationship	These show relationships among the constructs. Again, these may be of many types: associative, compositional, unidirectional, bidirectional, conditional, causal. The nature of the relationship specified depends on the purpose of the theory.
	Scope	The scope is specified by the degree of generality of the statements of relationships and statements of boundaries showing the limits of generalisations.
Components Contingent on Theory	Causal explanations	The theory gives statements of relationships among phenomena that show causal reasoning.
	Testable	The statements of relationships between constructs

Purpose	propositions	are stated in such a form that they can be tested empirically.
	Prescriptive statements	The statements in the theory specify how people can accomplish something in practice (construct an artefact or develop a strategy).

#### 3.4.1 Stance

The aim of this research is to generate descriptive and explanatory knowledge applicable to public organisations in emerging economies through an interpretive lens. To begin with, a descriptive analysis of the ERP implementation challenges and coping mechanisms is undertaken. The unveiled ERP implementation challenges and coping mechanisms are analysed and categorised. A taxonomy of ERP implementation challenges is presented. An explanatory causal theory is then generated to explain the dynamic and systemic interplay of the implementation challenges and influence of coping mechanisms on the implementation outcome.

### 3.5 Research Approach

Identifying the ideal research approach represents one of the most pertinent research design decisions (Blaikie, 2009). The four research approaches used to develop research conjectures can be classified into four main categories, namely, deduction, induction, abduction and retroduction. These provide different means to address the research questions (Blaikie, 2009; Ngwenyama, 2014). While the inductive and deductive research approaches have been widely used in social science research (Myers & Liu, 2009), abductive and retroductive research have, in recent years, garnered keen interest in the social science research sphere (Myers & Avison, 2002).

#### 3.5.1 The Deductive Research Approach

Deductive reasoning is described as a top-down, theory-testing process which is initiated by the analysis of the existing knowledge. A theoretical foundation is derived from the literature, after which logical conclusions are drawn in the form of general hypotheses and propositions. The derived hypotheses and propositions are then validated empirically. The results are generalised, based on the validation or falsification of the hypotheses and propositions. The generalised results contribute to new knowledge (Blaikie, 2009; Ngwenyama, 2014).

While the ultimate aim of deductive reasoning is a quest to uncover the truth and elements such as culture, language, knowledge and previous experiences, the researcher has a non-negligible influence on data collection. It is critical, therefore, to adopt a detached disposition in order to exclude any preconceived ideas, notions and personal values that lie within the researcher (Blaikie, 2009).

#### 3.5.2 The Inductive Research Approach

The ontological belief behind inductive research strategy assumes that the “*social world can only be observed or measured through the use of researcher-defined concepts*” (Blaikie, 2009, p.83). As such, the aim of this strategy is to identify patterns of association for the

phenomena under study and establish generalisations. Furthermore, the inductive research reasoning is described as a bottom-up approach with the focus on theory generation, as opposed to theory testing.

*“The researcher begins with an area of study and allows the theory to emerge from the data” (Strauss & Corbin, 1998, p.12).*

The starting point is the empirical observations made on a particular research topic. Concepts, themes and logical argumentation are derived through detailed analysis of the raw data and interpretation of the empirical observations. Propositions are derived based on the observations and interpretations which are then developed in a theory (Blaikie, 2009).

### 3.5.3 The Abductive Research Approach

The abductive research approach, as understood by Blaikie (2009), refers to the process of generating social scientific accounts grounded in socially constructed meanings and language of the actors involved. As such, the abductive research approach entails the ontological assumption that reality is socially constructed and emphasises the meaning, intentions, motives and interpretation attributed by social actors in their daily lives. Under this approach, the role of the researcher lies in discovering and describing this ‘insider’ view (Blaikie, 2009). An abductive research approach starts by determining hypotheses and propositions which can be tested through deduction. Through the use of a conceptual framework, new insights on the phenomenon under study are generated. Therefore, similar to an inductive approach, an abductive research approach aims to develop theory, while its core essence is, however, to gain an understanding of a new phenomenon through the meanings and language of the social actors (Blaikie, 2009; Kovács & Spens, 2005).

### 3.5.4 The Retroductive Research Approach

The retroductive research approach occurs in the context of conceptual, theoretical and ontological assumptions whereby the researcher already has a predefined understanding of the phenomenon under investigation at the initial phases of the study. It is typically used by social scientists to answer ‘why’ questions. It is aimed at uncovering the ‘real’ structures and mechanisms that affect the phenomena and the underlying cause of a regularity. Researchers construct a hypothetical model explaining the observed phenomenon. Subsequently, through the use of deductive reasoning, researchers describe and explain the observed regularities through their characteristics. The final step forms the crux of retroductive research; the aim here is to identify possible mechanisms explaining the regularities by making use of creative thinking, intuition and guesswork, and employing inductive reasoning (Blaikie, 2009).

### 3.5.5 Stance

An inductive research approach has been chosen for this research as the study sought to promote understanding of individual perceptions, not to prove a preconceived theory. Thomas (2006) argues that a general inductive approach produces reliable and valid findings through the use of a simple set of methodical procedures for analysing data. The primary objective of an inductive approach is to *“allow research findings to emerge from the*

*frequent, dominant, or significant themes inherent in raw data, without the restraints imposed by structured methodologies”* (Thomas, 2006, p.238). Codes were, therefore, generated from the data, rather than predetermined. Although literature-based codes can provide a useful tool, they can impede the development of new ideas (Hewitt-Taylor, 2001).

### 3.6 Research Data

The dominant research data in IS research are categorised as either qualitative, quantitative or mixed (Liu & Myers, 2011). One of the common distinctions between the qualitative and quantitative research data refers to the approach used to collect and analyse data. Initially designed in natural sciences to study natural phenomena, quantitative data sources include surveys and laboratory experiments (Liu & Myers, 2011; Myers & Avison, 2002). Qualitative data, on the other hand, were established in social sciences to study the social and cultural phenomena, seeking to develop explanations of the social world. Qualitative research fosters a process-oriented mindset with a strong focus on the research context, interpretation and subjectivism. Qualitative data sources can range from fieldwork and interviews to analysis of documents and texts (Myers & Avison, 2002).

#### 3.6.1 Stance

A qualitative research is deemed suitable for this purpose as opposed to a quantitative one, as qualitative research allows the researcher to gain new insights on the research area through various iterations whilst aiming to provide a better understanding of the social world (Myers & Newman, 2007). The use of qualitative research is increasingly useful in IS research, as the focus of the study frequently shifts from technological, managerial and organisational issues (Myers, 1997). Moreover, the significance of qualitative research lies in its explanatory power, permitting the researcher to appreciate the ERP implementation challenges from the perspective of different stakeholders through their lived experiences, subjective meanings, definitions, metaphors and symbols.

### 3.7 Research Strategies

Myers and Avison (2002) underline the use of case studies, action research, grounded theory and ethnography as some of the predominant qualitative research strategies.

#### 3.7.1 Stance: The Case Study Strategy

Given the nature of this study, the use of a case study research strategy is deemed suitable for this particular research context. This research seeks to provide an overall contextualised view of the ERP implementation process dynamics, to explain how the different ERP implementation challenges interact with each other and how organisations can overcome their ensuing challenges through the deployment of coping mechanisms. Venugopal and Rao (2011) advance that use of case studies is generally suited for implementation studies. ERP implementations are perceived as dynamic processes which are best studied in their settings through the use of case studies (Venugopal & Rao, 2011).

A case study is an *“empirical inquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident”* (Yin, 1989, p.13). Case studies are used to gain an in-depth understanding of

complex phenomena within their natural settings (Baxter & Jack, 2008; Benbasat, Goldstein, & Mead, 1987; Yin, 2013), relying on *“multiple methods of data collection to gather information from one or a few entities (people, groups, or organisations)”* (Benbasat et al., 1987, p.370).

Over the last three decades, case study research has been used extensively in IS research (Liu & Myers, 2011). The use of case study is the preferred research strategy for interpretive studies when the research questions attempt to answer the why and how questions and when contextual conditions aid the understanding of the research phenomenon (Yin, 2013). Case studies enable researchers to generate exploratory, descriptive and explanatory knowledge. Moreover, case studies allow for the collection of data from multiple sources of evidence including interviews, observations and documents, and across both single or multiple sites, usually over a period of time (Yin, 2013).

### 3.7.2 Generalisations

Yin (2004) emphasises that case studies can be applied to draw theoretical propositions emerging from the empirical observations. The validity of case studies to draw generalised inferences on specific areas of study has been corroborated by numerous scholars and studies (Lee & Baskerville, 2003; Walsham, 1995, 2006). Walsham (1995) concurs that generalisations from case studies can encapsulate concepts, theories, specific implications or rich insights (Walsham, 1995, 2006). In a similar vein, Lee and Baskerville (2003) propose a generalisation framework encapsulating four core generalisation dimensions, namely, from data to description, from description to theory, from theory to description and from concepts to theory. A prior study by Baskerville (1996) introduces the concepts of relevance and practicability as the essence of generalisation in research. Relevance can be characterised as the usefulness of the research, while practicability assesses the applicability of the research to practice (Baskerville, 1996).

The findings of this research are generalised through theoretical propositions. Theoretical propositions derived from the empirical observations are discussed in chapters five and six. The propositions contribute to rich insights and specific implications on the phenomenon of interest. The relevance and practicability of the research are thereafter summarised in chapter seven.

### 3.7.3 Case Selection

Based on contextual factors and the objectives of the research, careful consideration should be attributed to the selection of the cases in order to make informed decisions with regard to the use of either single or multiple cases (Yin, 2004). Case studies can be selected based on the nature of the study, geographical coverage, company size, organisational structures or specific industry sectors (Benbasat et al., 1987).

In consideration to the above-mentioned, the use of embedded cases within one holistic unit approach, as explained by Yin (2004), was opted for this research. One of the foremost motivations for the use of embedded cases lies in its suitability for in-depth analysis of the phenomenon through cross-comparisons.

Two potential organisations were shortlisted based on their recent implementation endeavours. With reference to the identified literature gaps and the stated research objectives of this particular study, an initial evaluation of the potential short-listed organisations and conversations with the researcher's acquaintances ensued. The final selection of the designated enterprise was based on the organisational context which best fitted the nature of this particular research.

The designated enterprise is characterised as a large, public organisation, with regional business units across South Africa. The selected organisation was going through a large-scale ERP implementation. At the time of the implementation, released media articles placed strong emphasis on the scale of the implementation. The selected case organisation is further described in section 3.13.

Once the choice of the case was finalised, the researcher proceeded to identify the embedded cases and units of analysis within the holistic unit. Walsham and Waema (1994) argue that emphasis should be on the credibility and strength of the logical reasoning used in describing results from the cases and in drawing inferences, as opposed to the statistical representativeness of such cases. With that in mind, two embedded cases were selected and deemed adequate for cross-comparison and internal validity. The two embedded cases are further described in section 3.13.4.

Two senior managers were approached to obtain permission to proceed with research within the business units they managed. The initial contact was established through the researcher's acquaintance who had previously collaborated with both senior managers. The researcher then provided both managers with a brief description and justification of the research. Confidentiality agreements were discussed. The researcher guaranteed to protect the anonymity of the organisation and participants. Further details on the two embedded cases and ethical considerations are provided in sections 3.9. and 3.12 respectively.

#### 3.7.4 Role of the researcher

Social researchers have to determine the type of role and relationship they want to sustain with their research subjects (Blaikie, 2009). Researchers can choose to be an outside observer or an involved researcher (Walsham, 1995). As an outside observer, the researcher chooses a neutral stance and is not immersed in the social situation, whereas an involved researcher becomes part of the phenomenon through action research and maintains close ties with the participants, whilst attempting to exert some form of influence on the participants (Blaikie, 2009; Walsham, 2006).

For the purpose of this study, the researcher adopted a detached demeanour and, consciously, assumed the role of an outside observer. The benefits of adopting such a stance result in the fact that the researcher is perceived as trustworthy and without any vested interest; this, in turn, encourages participants to freely express their views. In cases where the researcher maintains a neutral and outside stance, the main source of evidence for case studies comes from interviews (Walsham, 2006), allowing the researcher to have a rich understanding and interpretation of the occurrence of events and actions through the perception of the participants.

### 3.8 Research Time Horizon

Another pertinent issue faced by social scientists is the choice of the research duration. Research durations are grouped in the following four main categories, namely: longitudinal, repeated measure, cross-sectional and multiple snapshots (Chen & Hirschheim, 2004). The focus of longitudinal studies spans over a long, uninterrupted period of time with the emphasis being more on process rather than a single event. On the other hand, repeated measure studies involve the collection of data from the same participants at various time periods during a study, in order to assess the evolution of a phenomenon over time (Liu & Myers, 2011). Cross-sectional studies, on the other hand, collect data at a single point in time, with the objective of providing and studying a single snapshot of the phenomenon under study. In contrast, multiple snapshot studies collect various snapshots of the phenomena under study with a certain degree of variation between the different snapshots (Chen & Hirschheim, 2004). In the past, longitudinal and cross-sectional studies have been the most popular categories with few repeated measure and multiple snapshot studies (Chen & Hirschheim, 2004).

#### 3.8.1 Stance

Data was collected on a cross-sectional basis. The researcher sought different cross-sectional snapshots of the phenomenon under study to gain a richer and deeper understanding of the subject. The first set of data was collected in April 2012, around the implementation time of the ERP. The last set of data was collected in October 2014, almost two and a half years after implementation. Data collection over a period of 30 months allowed the researcher to capture the dynamics of the implementation process.

### 3.9 Data Collection

Yin (2004) argues that evidence from case studies may arise from six different sources, namely, interviews, archival records, documentation, direct or participant observations, and physical artefacts. While each of these techniques has its own merits and weaknesses, the onus is on of the researcher to select the most appropriate technique, based on the research method and approach. Through triangulation, a combination of techniques can also be used to substantiate the evidence (Yin, 2013).

Triangulation refers to the use of multiple research methods or data sources to reveal different facets of an empirical situation. The principal logic of triangulation stems from the fact that *“no single method ever adequately solves the problem of rival explanations”* (Patton, 1999, p.1192). According to Patton (1999), there are four types of triangulation which can be used to verify and validate qualitative findings. Table 3-4 summarises the different types of triangulation described by Patton (1999).

*Table 3-4: The different types of triangulation used for qualitative enquiry (Patton, 1999)*

Type of Triangulation	Description
<b>Methods Triangulation</b>	Qualitative and quantitative methods are employed in a complimentary way where qualitative methods validate quantitatively derived findings, or quantitative methods corroborate qualitative findings.



Type of Triangulation	Description
<b>Data Triangulation</b>	Data is collected from multiple sources to cross-check the validity of the findings. For instance, data collected through interviews can be validated by checking other sources such as written documentation, press releases or reports.
<b>Investigator/Analyst Triangulation</b>	Different researchers analyse data from the same sources, applying the same research methods, in an attempt to reduce potential bias while assessing the reliability and validity of the findings.
<b>Theory Triangulation</b>	Multiple theoretical perspectives are used in the interpretation of the phenomenon.

### 3.9.1 Stance

Semi-structured interviews were the primary source of data in this research, allowing unrestricted responses from the sample, while providing richer insights into the users' experiences, opinions and their perception of the ERP implementation challenges. Other data sources included direct observations, and review of documentation and artefacts, allowing the researcher to grasp an understanding of the subject from different perspectives. Data triangulation provides complimentary data insights and allows the researcher to understand the subject of study from different perspectives whilst reinforcing the credibility of the findings.

### 3.9.2 Research Sampling

Research sampling in qualitative research is seen as a complex undertaking as there are numerous overlaps between the different types of sampling. Some common examples of qualitative research sampling include theoretical sampling, purposeful sampling and selective sampling (Corbin & Strauss, 1990; Patton, 1990; Sandelowski, 1995). Patton (1990) argues that all qualitative research sampling falls under purposeful sampling as the qualitative inquiry generally starts with a small sample which has been purposely selected. Patton (1990) proposes 15 research sampling techniques including snowballing and stratified purposeful sampling under the purposeful sampling bracket. Sandelowski (1995), on the other hand, defines qualitative sampling as either selective or theoretical. At the beginning of the research, selective sampling emphasises the initial, preconceived decision made to select the sample subject. Theoretical sampling, on the other hand, refers to the decisions made on analytical grounds during the course of the study where the researcher decides on the next sample based on the analysis of the data (Strauss & Corbin, 1998).

### Stance

The researcher chose purposive snowballing for the initial set of interviews. However, the subsequent interviews followed both the principles of snowballing and theoretical sampling. Data collection ended once the researcher had established that theoretical saturation had been achieved in both cases. The emergence of themes until the point of saturation is further discussed in section 3.10.2.



### 3.9.3 Design of Semi-Structured Interviews and Research Population

Following the guidelines proposed by Myers and Newman (2007) for semi-structured interviews, an initial set of questions pertaining to the subject area was put together to guide the researcher. As the interviews progressed, the questions evolved accordingly and new questions were added to the question base. Interviewees were given the opportunity to express freely their perceptions and experiences about the ERP implementation, with the interviewer occasionally intervening to ensure the interviewees' answers remained pertinent to the area of research. In an attempt to elicit a complete understanding of the subject, the researcher improvised and asked spontaneous questions based on the given answers of the interviewees.

The duration of the interview was approximately 60 minutes, giving the researcher sufficient time for detailed probing where required. Most of the interviews were conducted successfully within one hour with the exception of two interviews which ran for almost one and a half hours each. The interviewees showed keen interest in the research subject and willingly extended their respective sessions. Although care was taken not to conduct more than one interview per day, two successive interviews were conducted on two separate occasions. The researcher took extensive notes while also recording the interview. After each interview, the data were transcribed, coded and analysed. Follow-up interviews were arranged in cases where further clarifications were required.

The interview was broken down into different sections. The initial list of questions is included in appendix 9.4. Section A represented the introductory component. Each interview started with an introductory session where the interviewer first welcomed and expressed gratitude towards the interviewee for setting time apart for the interview. The interviewer then briefed the participant on the purpose of the research and the research objectives. Section B dealt with ethical and confidentiality issues. The interviewer assured the interviewees that all the interviews were confidential and that their personal details would not be revealed at any stage during the study. Moreover, the interviewees were informed of their rights not to answer any discomforting questions. Interviewees could request a copy of the respective interview transcript or results. Sections A and B were deemed crucial aspects of the opening dialogue with the aim of ensuring that the interviewee was comfortable and aware of the researcher's intentions, whilst aiming to ensure better participation. In section C, the interviewer inquired on the role of the interviewee in the organisation and on the different software applications the latter was using. Sections D formed the core of the interview with questions focusing on interviewees' experiences of using ERP systems, the challenges they faced during the implementation and post-implementation stages, the consequences and impact of the challenges and the different coping mechanisms in place to deal with the challenges. Based on the given accounts of the interviewees, a set of probing questions were further posed. These questions were asked spontaneously and were subsequently added to section E. At the end of each interview, the researcher once again thanked the interviewees for their participation. The researcher asked each interviewee whether they would be keen to participate in a follow-up interview if required and whether they could recommend anyone else in the respective area who would be willing to share their experiences.

#### 3.9.4 Challenges Experienced while Conducting the Interviews

This section reports on the challenges the researcher experienced while conducting the interviews and the measures taken to overcome the respective challenges. Arranging and coordinating some of the interviews became problematic due to the unavailability and busy schedules of the participants. Moreover, at times, some of the interviewees were very hesitant to disclose sensitive information. An example is provided below.

*“I can say lots of things but I also need to be careful what I say” SU4B.*

In these particular cases, the interviewer emphasised the confidentiality clauses to reassure the participants of their anonymity. Another noted challenge related to the complexity in interpreting the precise meaning of the gathered data. Moreover, because the organisation had been through a restructuring which involved both a new ERP implementation and a re-implementation of existing ERP systems, interviewees could not always clearly delineate and differentiate the two separate projects. The researcher ensured that the challenges unveiled remained authentic to the implementation of the new SAP modules by going through the transcribed data multiple times and selectively omitting unrelated data. Moreover, the status quo within the organisation kept evolving during the data collection phase, which further added to the complexity in interpretations. Through the principle of hermeneutics and dialogue reasoning as proposed by Klein and Myers (1999), the researcher iteratively analysed each segment of text against the prior context and the whole transcribed interview, to gain an accurate and holistic view of the implementation process.

Additionally, the researcher found it increasingly difficult to gather data from top-level and executive employees. After many unsuccessful attempts to consult with top-level management, the researcher decided to limit the interviews to three categories of employees, namely, end-users, support-users and middle-level management. Still, the three categories of employees represented different voices in the organisation. Use of different categories of employees signifies a triangulation of subjects (Rubin & Rubin, 2005). Triangulation of subjects avoids bias whilst promoting a broader understanding of the research subject and ensuring that the views of different categories of employees are heard (Miles & Huberman, 1994).

#### 3.9.5 Conduct of Semi-Structured Interviews

Data were collected from two embedded cases within the same organisation. While most of the interviewees were sourced from the Western Cape region, a few selected employees operating from Johannesburg and the Eastern Cape were also interviewed. The approach used in both cases was similar, whereby, initially, interviewees were selected through purposive sampling. All interviews were conducted by the researcher. Face-to-face interviews were scheduled for employees operating from the Western Cape region while telephonic interviews were conducted with participants operating from the other regions. A total of 24 interviews were conducted from both cases.

##### Case A

Employees from this particular case were seen as project initiators and were currently using numerous IT applications to capture and manage their projects. Some of the applications

used included a workflow management system (WFMS), a geographical information system (GIS), and numerous locally developed solutions, through the use of MS applications such as Access and Excel. The WFMS was used to initiate and capture project information while the GIS was used to design and simulate new projects at their potential locations. A SAP Project Portfolio Management (PPM) solution was implemented to replace the WFMS and the numerous bespoke applications. Another core objective of SAP PPM was to provide an integrated framework with the GIS software.

At the time of the interviews, SAP PPM had just been implemented and the interviewees from case A had just completed the organisation-wide enterprise systems training. A total of 12 interviews were conducted between April 2012 and May 2013. However, one of the interviews could not be used and was subsequently dropped from the sample due to poor recording quality. Each participant was assigned a unique code. The interviewed sample in this case comprised of four end-users, three support-users and two managers. The sample consisted of six males and three females. Table 3-5 provides an overview of the participants interviewed and the number of interviews conducted.

*Table 3-5: Overview of Participants and Number of Interviews (Case A)*

Assigned Participant Code	Role in Organisation	Functional Position	No of Formal Interviews	Sequence of Formal Interviews
<b>EU1A</b>	End User	Senior Engineer	2	A1, A10
<b>EU2A</b>	End User	Engineer	1	A2
<b>EU3A</b>	End User	Senior Engineer	1	A9
<b>EU4A (Dropped)</b>	End User	Engineer	1	A8
<b>MM1A</b>	Managerial Staff	Senior Manager	2	A4, A11
<b>MM2A</b>	Managerial Staff	Manager	1	A12
<b>SU1A</b>	Support User	IT Support Administrator	1	A3
<b>SU2A</b>	Support User	Senior Technician	2	A5, A7
<b>SU3A</b>	Support User	Senior Engineer/Compliance Officer	1	A6

All the interviewees had prior exposure to enterprise systems as they were using SAP Human Capital Management (HCM) to manage their attendance. End-users had been exposed to the SAP PPM through the enterprise-wide training initiatives conducted by the organisation. On their part, support-users were either qualified SAP PPM in-house trainers or were involved in some development aspect of SAP PPM. Both SU2A and SU3A were part of the SAP PPM and GIS integration team, whereas SU1A was an in-house SAP PPM trainer. MM1A oversaw the forecasting unit across the western region whereas MM2A was responsible for the forecasting unit in the eastern region. Both managerial employees were active users of SAP HCM.

## Case B

Employees from case B were subsequently interviewed. Employees utilised the WFMS and numerous MS Office applications such as MS Excel, MS Access and MS Projects to execute their planned processes. SAP PPM and SAP cProjects modules were expected to replace the WFMS and the MS office applications.

A total of 12 interviews were conducted from July 2013 to October 2014. The initial interviews encompassed the division's managerial employees. Support-users and end-users were subsequently interviewed. Similar to case A, each participant was assigned a unique code. The interviewed sample from case B comprised three end-users, four support-users and two managers. This sample consisted of four females and five males. Table 3-6 provides an overview of the participants interviewed and the number of interviews conducted.

*Table 3-6: Role of Participants and Applications Used (Case B)*

Assigned Participant Code	Role in Organisation	Functional Position	No of Formal Interviews	Sequence of Formal Interviews
<b>EU1B</b>	End User	Project Officer	1	B6
<b>EU2B</b>	End User	Senior Project Manager	1	B9
<b>EU3B</b>	End User	Senior Engineer	1	B10
<b>MM1B</b>	Managerial Staff	Senior Manager	2	B1, B2
<b>MM2B</b>	Managerial Staff	Manager	1	B3
<b>SU1B</b>	Support User	IT Support Administrator	1	B4
<b>SU2B</b>	Support User	IT Support Administrator	1	B5
<b>SU3B</b>	Support User	Systems Controller	2	B7, B11
<b>SU4B</b>	Support User	Senior Compliance Officer	2	B8, B12

Contrary to end-users from case A, end-users from case B were active users of enterprise systems. In addition to SAP HCM, they were also active users of SAP PS and SAP MM. The different systems used by the participants are depicted in Figure 9-4. SU1B, SU2B and SU3B were qualified in-house SAP PPM and cProjects trainers and were involved in numerous training and support activities. Moreover, SU2B and SU3B used SAP PPM for reporting purposes. Meanwhile, SU4B played a more strategic role and oversaw the compliance of the new SAP solutions across the various regional units. MM1B oversaw the implementation unit across the western region, while MM2B reported to MM1B and was one of the few employees involved in the SAP implementation from the initial phases.

### 3.9.6 Direct Observations

Direct observations allow the researcher to gain useful information on the phenomenon of interest through the monitoring of behaviours during a selected period of time (Yin, 2004). Consequently, the researcher conducted multiple site visits. As mentioned in section 3.7.4, a detached stance was adopted and care was taken to ensure that end-users did not feel

intimidated by the researcher's presence. During the visits, the researcher relied on hand-written field notes to mark down any peculiar observations, arising from the informal conversations and discussions which took place. The field notes helped the researcher to make sense of, reflect and interpret the observational data.

#### Case A

Following the first two interviews, the researcher was invited to spend a few days at the local office. The visits were informal and the researcher solely observed the work settings and casually interacted with different employees. Informal conversations were held over lunch and coffee breaks. The visits allowed the researcher to familiarise with the employees, identify potential interviewees and establish an amicable rapport. The researcher was also invited to a team lunch organised by the business unit where employees shared their views on the implementation.

#### Case B

A similar strategy to case A was adopted. The researcher visited the site multiple times and spent time observing and casually interacting with potential interviewees. MM1B introduced the researcher to EU1B who, in turn, presented the researcher to different employees and participants including SU3B and EU2B. Participants willingly discussed and sketched the organisational structure of the company. In addition, they introduced the different ERP systems that they engaged with on a daily basis as well as the different issues they faced with the new solutions. Photographic evidence of these rich pictures is included in appendix 9.5. The researcher also attended a feedback meeting initiated by MM1B. The purpose of the meeting was to engage with selected end-users and to understand their concerns related to use of the new enterprise solutions.

#### 3.9.7 Documentary Evidence

Documentary evidence formed the secondary source of data. The researcher relied on various sources of publicly accessible documentary information to gain an initial insight of the organisation, the selected cases and different business processes. The accessed information included documents such as organisational documents downloaded from the company's website and publicly released corporate presentations. Thereafter, documents such as media releases and audit reports were used to corroborate the data collected from the interviews. In situations where contradictory evidence was noted, the topic was further scrutinised for a deeper and more accurate understanding of the situation. The relevant documents were added to the repository in Atlas.Ti and were thoroughly analysed during the data analysis phase.

### 3.10 Data Analysis

This research attempted to answer three main research questions. Different analytic techniques were used for the different research questions while consistently applying the principles of Klein and Myers (1999) throughout the process. The principles of thematic analysis and principles of constant comparative analysis were used to answer research questions 1 and 3, while principles of system dynamics modelling were used to answer research question 2.

### 3.10.1 Thematic Analysis and Constant Comparative Analysis

Thematic analysis is a powerful analytic tool used to analyse and report on identified patterns within data. The identified patterns are commonly labelled as themes (Attride-Stirling, 2001; Braun & Clarke, 2006). Identified in relation to the posed research questions, the themes denote patterned responses and some meanings within the data (Braun & Clarke, 2006). An inductive approach to thematic analysis ensures the analysis is data-driven with a close link between the uncovered themes and the gathered data.

*“Originally developed for use in grounded theory methodology of Glaser and Strauss”* (Thorne, 2000, p.69), analytic methods such as thematic analysis and interpretive descriptions now depend on constant comparative analysis to aid in the understanding of *“human phenomena within the context in which they are experienced”* (Thorne, 2000, p.69).

In this particular context, constant comparative analysis has been used in conjunction with thematic analysis to aid in the identification of emerging patterns and themes, allowing a code to code, theme to theme and category to category comparisons between the different stakeholders and the two cases.

The subsequent steps detail the adopted analysis procedures used to identify the ERP implementation challenges and coping mechanisms. The first four steps of data analysis were standard procedures applied to each interview before starting the analytical process. Steps five to nine denote the iterative analytic procedures and have been adapted from the thematic analysis guidelines by Thomas (2006) and Braun and Clarke (2006).

1. Data Transcription: The first step involved the transcription of each interview recording to a word document file. The transcription process was a meticulous process where each recording was run at least three times. As an initial step, the first recording was run to familiarise the researcher with the context and content. A second run of the recording involved the actual transcription, after which the researcher listened to the recording a third time while reading the transcribed text. This process ensured that the researcher obtained a full descriptive account of each interview. Once the interviews had been transcribed, the following steps were undertaken to ensure a methodical approach to data analysis:
2. Data Preparation: The transcribed file was standardised using a common template to clearly delineate the questions and answers of each interview. Each transcribed file was assigned a unique name. A backup of each recording and transcript was made.
3. Data Migration and Backup: The standardised document was then transferred to Atlas.ti. Use of specialist qualitative analysis software is known to speed up the coding and analysis process by providing the researcher with a manageable option to access a large number of coded texts (Thomas, 2006).
4. Familiarisation of Data: Each document was carefully read to identify general themes pertaining to the research questions.
5. Assignment of 1<sup>st</sup> level codes: Each line of text or each paragraph was carefully read multiple times to understand the attributed meaning of the text. All the relevant sections of text associated with the research questions were assigned a code or a group of words. This process, usually referred as in vivo coding, involves the coding

of actual text segments. This process was conducted on Atlas.ti and proved to be a rigorous and time-consuming process where each segment of text was carefully read and reread against the research question and subsequently assigned a code. One of the challenges faced by the researcher related to the emergence of numerous lower level codes following the inductive thematic analysis.

6. Emergence of 2<sup>nd</sup> level codes or themes: The 1<sup>st</sup> level codes were then grouped into specific themes. Initially, grouping of 1<sup>st</sup> level codes into themes proved to be highly complex. The challenge was to reduce and group the 1<sup>st</sup> level codes into a manageable number of themes, whilst ensuring the richness of the lower level analysis was not lost. As per literature, this level of analysis should generate between 20 and 40 themes (Thomas, 2006).
7. Review and refinement of codes and themes: The underlying codes and themes were constantly reviewed and refined. These steps proved to be intense and complex. Multiple iterations of steps 5 and 6 were required in order to finalise the groupings of the themes.
8. Emergence of 3<sup>rd</sup> level codes or high-level categories: In this step, the themes were further grouped into higher level categories.
9. In addition to thematic analysis, the researcher used the principle of constant comparative analysis to ensure that each emerging 1<sup>st</sup> level theme and 2<sup>nd</sup> level theme was checked for representativeness against other interviews. A cross-case analysis was also undertaken, as discussed in chapter four.

Steps five, six, seven and nine were applicable to all three RQs. Step eight was sequentially applied to both RQ1 and RQ3. While the output of RQ1 was a taxonomy of ERP implementation challenges, RQ3 unveiled the coping mechanisms used to overcome the different challenges faced by organisations.

### 3.10.2 Application of Thematic Analysis and Emergence of Themes: RQ1

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*What are the major challenges faced by public African organisations when implementing an ERP system?*

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Table 3-7 shows the applicability of steps 5 to 8 as discussed in section 3.10.1.

*Table 3-7: Coding of Themes through Thematic Analysis*

ID	Text Quote	1 <sup>st</sup> Level Theme	2 <sup>nd</sup> Level Theme	Category
MM1A	Out of the six provinces, there are probably only three of them which are using SAP PPM.	Partial Usage of System	Resistance to Change	Change Management Challenges
EU2A	Fifty-two hundred different	Many Blocks	Lack of	Technical



	cells/blocks to fill in for one project...	to Fill in	Customisation (Lack of adequate configuration of information)	Challenges
<b>EU2B</b>	It came to the point where the business said if there is no cProjects schedule in SAP, we won't have budget allocated to it. So we were kind of forced to use it.	Forced Usage	Coercive Management	Management Challenges

Step 5 as detailed above gave rise to 78 first level codes relating to ERP implementation challenges. The first level themes were condensed to 38 themes, which were further refined and reduced to 27 themes. The resulting 27 themes were then grouped into six main categories of ERP implementation challenges. Figure 3-1 and Figure 3-2 depict the emergence of the second level themes with respect to the sequence of conducted interviews from both cases. The interviews from case A have been labelled chronologically from A1 to A12 while the interviews B1 to B12 indicate the sequence of the interviews conducted in case B.

#### Emergence of 2<sup>nd</sup> Level Themes: Case A

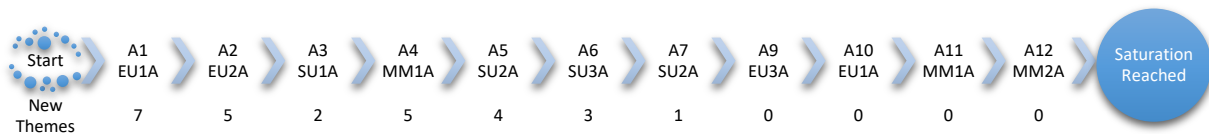


Figure 3-1: Emergence of New Themes - Case A

As illustrated in Figure 3-1, seven new themes emerged from the first interview, with an additional five new themes emerging from the second interview. Two new themes were uncovered from the third interview. Five new themes arose from the fourth interview and an additional four themes emerged from the fifth interview. Three new themes were unveiled from the six interviews and one theme from the seventh interview. No new themes emerged from the last four interviews, indicating that theoretical saturation had been reached. The last sets of interviews were deemed important for reliability and validity purposes.

#### Emergence of 2<sup>nd</sup> Level Themes: Case B

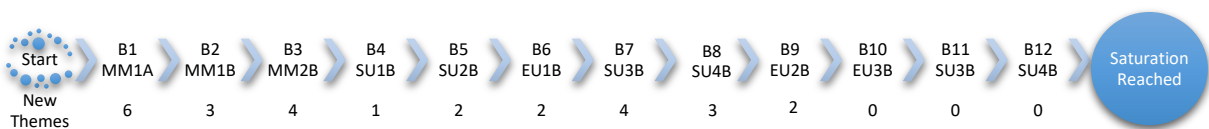


Figure 3-2: Emergence of New Themes - Case B



As illustrated in Figure 3-2, six new themes emerged from the first interview. The ensuing interview unveiled another three new themes. The third interview uncovered an additional four novel themes while only one new theme emerged from the fourth interview. The fifth and sixth interviews revealed two new themes respectively. A further four new themes arose from the seventh interview while three new themes surfaced from the eighth interview. Another two new themes surfaced from the ninth interview. No new themes emerged from the last three interviews, signifying theoretical saturation.

### 3.10.3 Application of Thematic Analysis and Emergence of Themes: RQ3

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*How can organisations overcome their ERP implementation challenges through the use of coping mechanisms?*

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Thematic analysis, as discussed in section 3.10.1, has been used to answer the above research question. The researcher unveiled 22 second level themes which were subsequently refined into 12 themes. The 12 themes were grouped into five main categories of coping mechanisms. The coping mechanisms are discussed in chapter 6.

### 3.10.4 System Dynamics and Causal Loop Modelling: RQ2

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*How do the ERP implementation challenges interact with each other from a systemic perspective?*

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This research question stems from previous studies of ERP implementation studies, criticising the laundry lists of CSFs and CFFs, which hardly place any emphasis on the dynamic interplay between the different variables. In order to address this shortcoming, a system dynamics approach was deemed appropriate in order to display the complex interrelationships between the different unveiled challenges. A system dynamics approach facilitates understanding of complex, dynamic, non-linear systems, as system behaviour can be modelled through the use of feedback loops and time delays (Sterman, 1994). The use of feedback loops and time delays depict the foundation of systems thinking (Senge, 2006). One of the principles of modelling system dynamics is the effective identification and representation of feedback loops. Feedback loops are categorised as either reinforcing (positive) or balancing (negative) loops. A reinforcing loop relates to actions that lead to a snowballing effect, amplifying the situation, whereas a balancing loop provides stability to the system by self-correcting the system. Hence, causal loop modelling is a useful technique to depict the systemic nature of social systems.

*“Causal loop diagrams provide a language for articulating our understanding of the dynamic, interconnected nature of our world” (Kim, 1992, p.5).*

Causal loop modelling has the ability to exhibit the dynamics between variables and to demonstrate the cause and effect of variables, while depicting the system over time through the use of delays, which forms another important component of system dynamics. Delays depict the effects of a decision on the state of the system through time lags. Delays may have a negative impact on the system, leading to system instability and oscillation (Senge, 2006; Sterman, 2001). Systems thinking and causal loop modelling are, therefore, an effective way of mapping complex phenomena under investigation. Moreover, each situation can be modelled differently and, while there is no right model, an ideal model is one that aptly depicts the context accordingly (Goh, Brown, & Spickett, 2010). The mechanics of creating causal loops, as discussed by Kim (1992), are presented in Table 3-8. The last column shows the applicability of the guidelines to the context of this research. The resulting causal loop depicting the systematic interplay of the identified challenges is presented in chapter 5.

*Table 3-8: Mechanics of Creating Causal Loops (Kim, 1992)*

	Explanation	Application
<b>Theme Selection</b>	A specific issue or theme is selected. The selected issue reflects the situation where deeper insights and understanding are sought.	This research attempts to unveil the dynamic interplay between the different ERP implementation challenges.
<b>Time Horizon</b>	The selected time horizon should be long enough to allow the evolution of the dynamics.	The first cycle of data collection started in April 2012 and the last cycle ended in October 2014. The different data collection phases allowed the researcher to experience the evolution of the implemented ERP systems.
<b>Boundary Issue</b>	The purpose is to map key themes related to the issue and not to model the entire system behaviour.	In the first instance, the researcher identified all the ERP implementation challenges and coping mechanisms through an inductive analysis. The resulting causal loop reflects only the pertinent challenges and coping mechanisms, as discussed by the different participants.
<b>Level of Aggregation</b>	The complexity of a causal loop is not determined by the number of variables; rather, complexity is depicted through the inter-relationships of the selected variables.	Initially, the researcher unveiled 38 meso-level variables which were systematically reduced to 27 variables. The 27 variables were further grouped into 14 variables. The final causal model depicts the

		inter-relationships of the 12 variables.
<b>Significant Delays</b>	Delays are important aspects of causal loops and should be included to depict the imbalances of the system.	After-effects of the ERP implementation have been identified and through the interviews, the researcher has been able to gather enough information about the sources of delays.

### 3.10.5 Data Analysis Process

The data analysis process is summarised in Figure 3-3. Steps one to seven formed the foundation phases of the inductive thematic analysis and were applicable to all three RQs. Step eight was only applicable to RQ1 and RQ2 as discussed in sections 3.10.2 and 3.10.3 respectively. The application of the causal loop modelling is further discussed in chapter 5.

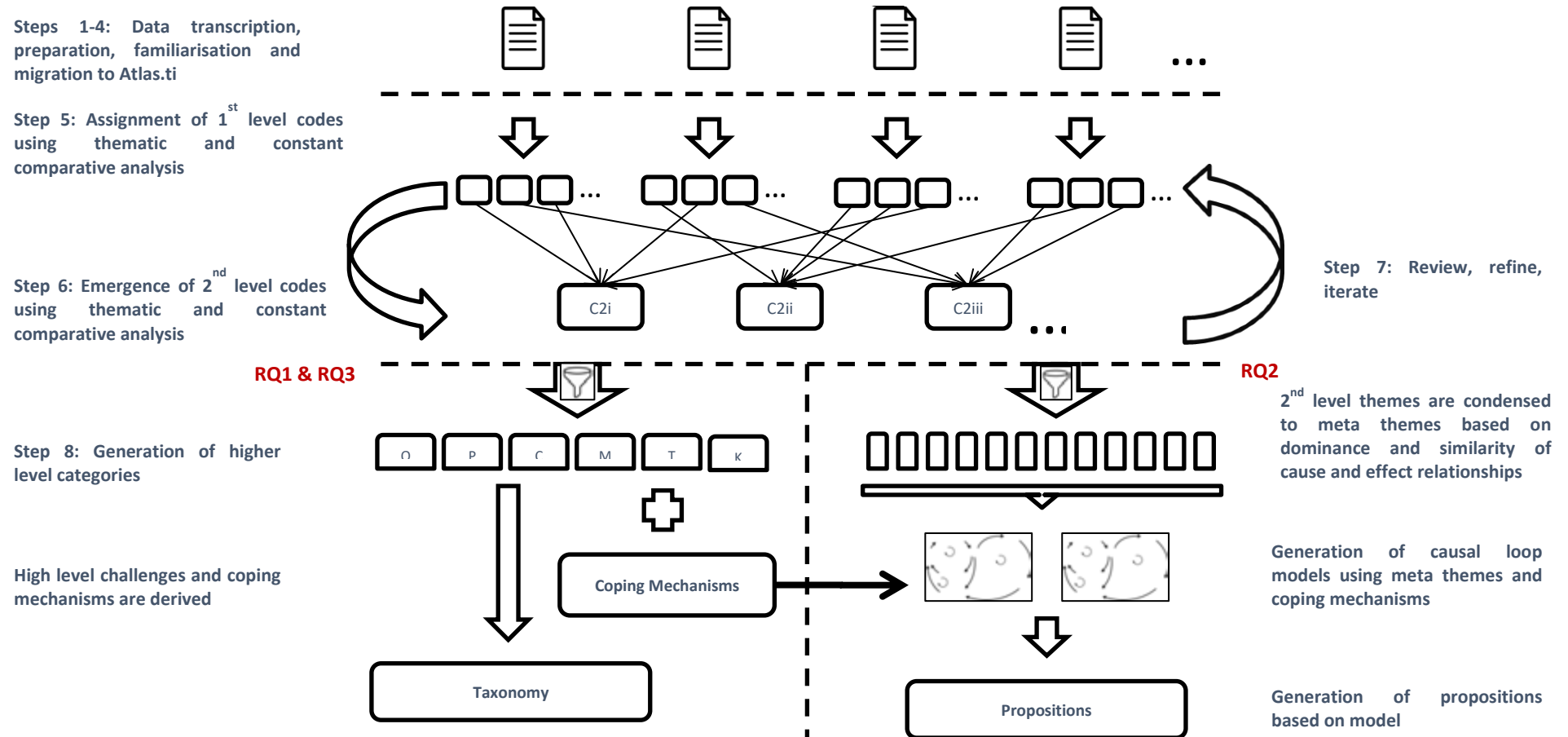


Figure 3-3: Data Analysis Process

### 3.11 Ensuring Research Rigour

An important aspect of interpretive qualitative research is to ensure rigour throughout the research. Interpretive rigour requires the researcher to demonstrate how interpretations of the data have been derived from the findings. Based on their reading and application of anthropology and philosophy, Klein and Myers (1999) propose a set of seven principles, based on the elements of insight, critique and transformative redefinition. These principles are seen as a valuable way for interpretive researchers to critically reflect and defend the methodological approach of their work (Walsham, 2006). Table 3-9 provides a brief description of each principle, followed by its application to the context of this research.

*Table 3-9: A set of principles to evaluate interpretive studies (Klein and Myers, 1999, p.72)*

Principle of	Description
<b>Hermeneutic Circle</b>	All human understanding is achieved by iterating between considering the interdependent meaning of parts and the whole that they form.
	Data collection and analysis consisted of an iterative process, whereby representation of the parts were constructed based on the different participants' statements. The consolidation of these statements gave rise to shared meanings and understanding between the researcher and participants and the conceptualisation of the theoretical model which, then, formed the whole. The resultant taxonomy of the ERP implementation challenges and systemic view of the challenges and coping mechanisms were constructed through the interpretation of the collected data.
<b>Contextualisation</b>	Critical reflection of the social and historical background of the research setting, so that the intended audience can see how the current situation under investigation emerged
	The researcher relied on documentary evidence, besides the primary source of data, in order to understand the historical context of the organisation. Contextual information is included in the case description. Documentary evidence provides some insights into the historical settings of the organisation and rationalisation for the decision to implement an ERP solution.
<b>Interaction between the Researchers and the Subjects</b>	Critical reflection on how the research materials were socially constructed through the interaction between the researchers and participants
	The researcher acknowledged instances whereby interviewees were reticent to disclose sensitive information. In such cases, the researcher reassured the participants of their confidentiality and ensured that the participant felt comfortable to provide truthful accounts of their experiences. The informal conversations described in section 3.9.6 were also seen as an appropriate means to get acquainted and remove any inhibitions that might exist between the researcher and the interviewees.
<b>Abstraction and Generalisation</b>	Relating the idiographic details revealed by the data interpretation through the application of principles one and two to theoretical, general concepts that describe the nature of human understanding and social action
	The findings of this research were generalised through an explanatory theory portraying

the systemic interplay between the different ERP implementation challenges. Propositions were derived to provide rich insights and specific implications on the phenomenon of interest.

<b>Dialogical Reasoning</b>	Requires sensitivity to possible contradictions between the theoretical preconceptions guiding the research design and actual findings with subsequent cycles of revision
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The initial themes and categories were revised and refined continuously for the different iterative cycles of analysis. Different possibilities and contradictions were thoroughly analysed before finalising the current model. Additionally, an earlier version of the model was presented to interviewee, SU4B who provided rich feedback on the researcher's interpretation of the data.

<b>Multiple Interpretations</b>	Sensitivity to possible differences in interpretations among the participants as they are typically expressed In multiple narratives or stories of the same sequence of events under study
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Different categories of users namely; end-users, support-users and managerial employees were interviewed, therefore, allowing the researcher to explore multiple stakeholders' perspectives on how the implementation was perceived.

<b>Suspicion</b>	Requires sensitivity to possible biases and systematic distortions in the narratives collected from the participants
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The researcher acknowledges the possibility of any preconceptions or misrepresentations in participants' interpretations. None of the interviewees had any ulterior motive to distort the facts. Nonetheless, the researcher relied on multiple viewpoints for corroborating evidence, ensuring that interviewees' interpretations were not biased. The use of cross-comparative analysis allowed the researcher to uncover any potential misrepresentations of the facts. Moreover, the use of co-occurrence analysis was another means to unveil the existence of any falsified relationship.

Furthermore, selected criteria and strategies defined by Guba and Lincoln (2000) were applied throughout the data collection and data analysis phases to ensure rigour in this research. The researcher relied on prolonged engagement and persistent observation to ensure theoretical saturation. Prolonged engagement was achieved through the numerous field visits and informal conversations with the participants prior to and after the interviews. Follow-up interviews also allowed the researcher to get a deeper understanding of the subject of interest. Moreover, use of data triangulation ensured that data collected was complete and portrayed an accurate representation of the phenomenon of interest. Additionally, in the initial phases of data analysis, peer debriefing was used and seen as a valuable exercise. The researcher sought the opinion of the research supervisor, an expert in the field, who reviewed and cross-checked the initial transcripts to confirm the validity of the emerging themes and categories.

The use of Atlas.Ti as a data management tool also allowed the researcher to query the data in a consistent way and to maintain an audit trail. Relationships were uncovered through a process of co-occurrence analysis. Both the c-coefficient values and the frequency of co-occurrences were used to ensure the dependability of the unearthed relationships. The researcher relied on numerous queries to ensure that the derived theoretical propositions

emerge and truly represent the empirical observations. Following Fereday & Muir-Cochrane (2008)'s recommendation, in-text quotations illustrating participants' interpretations were utilised to ensure credibility.

### 3.12 Ethics and Confidentiality

This study was authorised by the Ethics Committee of the Faculty of Commerce at the University of Cape Town. At the onset of the data collection phase, a research summary, the planned interview questions, a cover letter, a participant consent, together with an ethics application form were drawn and sent to the Ethics Committee. Upon Ethics approval, the cover letter and participant consent forms were emailed to potential interviewees. At the start of each interview, the researcher briefed each interviewee on the purpose of the research. The interviewees were also informed of their rights to withdraw from the study or not to answer any uncomfortable questions. Consequently, the researcher assured confidentiality and anonymity by withholding names and ensuring that no individual or company details were published in the final report. Moreover, interviewees could request a copy of the respective interview transcript or results. Requests from participants interested in obtaining the final results of the study were acknowledged by the interviewer.

### 3.13 Organisational Case Description

The selected organisation underwent a major restructuring which included organisational changes, the implementation of new SAP solutions and the migration of existing SAP systems throughout its different operating business units into one centralised system. Employing over 40 000 people, the case organisation has operating business units spanning all provinces of South Africa. The core operating functions are broadly categorised as operational, support and research and development (R&D) functions. The operational function consists of four core line functions anonymised as: DX, TX, GX and CX. The support function aims at providing supporting services such as Information Technology (IT), Human Resource (HR) and Finance to the business, whereas the research and development (R&D) function unit is responsible for providing strategic insights, researching best practices and setting standards. A simplified organisational structure is provided in Figure 3-4.

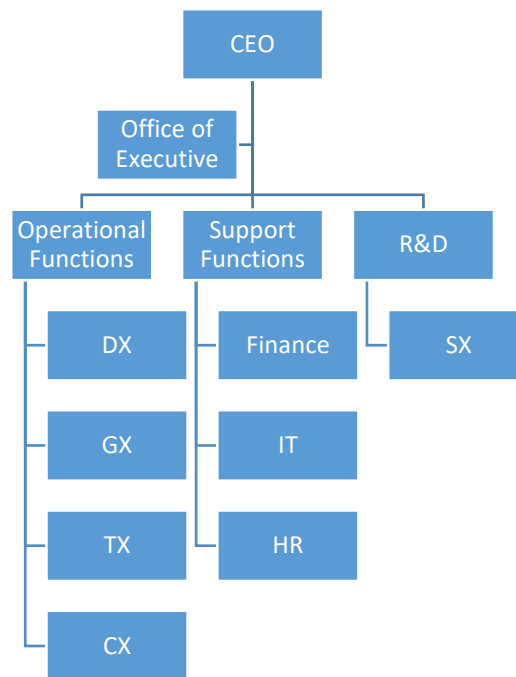


Figure 3-4: Organisational Structure of Selected Enterprise

The operational and support functions operate in a decentralised environment, with each operating unit and support unit having numerous localised regional divisions throughout the country.

### 3.13.1 Organisation Background and Existing Systems

The organisation employs diverse ERP solutions and bespoke applications, and uses a number of Microsoft applications to support its major line functions. Historically, each line function had its own standalone systems configured to meet the requirements of its specific business unit.

*“[The organisation] is divided into different divisions: DX, GX, TX .... Each of these divisions had their own standalone systems” MM1B.*

The lack of standardisation across the different units made it difficult for the organisation to acquire reliable data to collate in order to actuate strategic and operational business initiatives based on informed decisions.

*“So you can imagine if the CEO wants to draw a report for everyone, you couldn’t because of the different systems used in each unit. So what it means is that you have to interrogate each bespoke system and consolidate the information on Excel which is quite a huge task in a big organisation like ours” MM1B.*

The resultant consequences gave rise to poor decisions made at strategic level, operational inefficiencies, and inability of the organisation to react to market conditions and to customer demand. Moreover, the organisation was already confronting a financial crisis and the need to secure external funding for the organisation’s capital expenditures was of utmost precedence.



### 3.13.2 Process and IT Restructuring

In an attempt to overcome some of its major challenges, the organisation underwent a restructuring and termed the initiative as the 'back-to-basics (B2B) drive'. The essence of the B2B drive was to ensure that all processes were standardised, simplified and optimised to their maximum capacity. The restructuring was headed by the recently appointed CFO. The restructuring consisted of numerous phases which included both the implementation of new SAP solutions and the migration of existing SAP systems into a centralised solution.

### 3.13.3 New SAP Implementation

In this study, the researcher opted to focus solely on the implementation of new SAP modules. A strategic decision was adopted at executive level to implement a SAP vanilla solution across all the various units. The essence of the new SAP implementation was to automate the tracking and monitoring of strategic and operational projects to enhance visibility and integrity of information to prioritise and allocate funds based on the criticality of projects.

*"The main driver for the ERP system was the financial crux that [the organisation] experienced a few years ago. Basically, we had a funding shortage and we had to prioritise areas that needed investment. A holistic ERP solution was required so we could have a better visibility of all projects within the environment and have information such that we can drive these projects and ensure that [the organisation] has a sustainable business"*  
SU3A.

Moreover, the organisation sought to integrate crucial third party applications to the SAP platform and to phase out the numerous bespoke applications. The objective was to optimise the use of one integrated SAP solution across the organisation, while reducing the maintenance of numerous bespoke solutions.

This phase entailed the deployment of SAP PPM and SAP cProjects. SAP PPM was to be used throughout the three main operating functions of the business, namely, DX, TX and GX units. In an attempt to retire the numerous bespoke solutions, SAP PPM was promoted as the new official planning tool across the business. The organisation was, at the time, making use of a WFMS to capture and manage the lifecycle of different projects.

*"SAP PPM was supposed to replace [the WFMS] ..."* EU2B.

Moreover, the organisation acquired SAP cProjects which was promoted as the official scheduling tool. Allocation of all project tasks, both existing and new, had to be accomplished through a cProjects schedule.

Go-Live was achieved in May 2012. Following the implementation, all existing projects were migrated to SAP PPM solution. The directive from management was that different operating units would, henceforth, be responsible for the input of all the required project information into SAP PPM solution. Use of SAP PPM and cProjects was mandatory and, as prescribed by management, only projects uploaded onto SAP PPM with a cProjects schedule would be allocated budgets.

*“It came to the point where the business said if there is no cProjects schedule in SAP, we won’t have budget allocated to it” EU2B.*

*“... no project in [the organisation] will be funded if it does not go through the PPM module. So the understanding is that PPM has been deployed and is being used” SU3A.*

#### 3.13.4 Unit of Analysis: The DX Operating Function Units

This research focuses mainly on the DX operating function. The organisation currently has six regional DX units with each unit reporting to a regional general manager (GM). The regional GMs, in turn, are managed by a general DX executive (GDE) based at the head office who is directly accountable to the Chief Executive Officer (CEO). The two primary business units under DX can be grouped into the forecasting and implementation units which have been referred to as case A and case B respectively. The primary role of the forecasting sub-unit is to investigate potential future development plans through the use of forecasting and simulation tools and exercises. Headed by regional planning managers, the forecasting unit predominantly employs engineers and technicians as forecasting planners. The implementation unit, on the other hand, oversees the successful execution of the forecasted projects and is headed by regional implementation managers. Most of the employees are engineers working as project managers, project officers and IT support staffs.

#### 3.13.5 Implementation Outcome

##### Current Organisational Situation

Despite the public press releases claiming that the implementation was a success and completed within scope, budget and time, the views differed from an operational perspective. The ERP implementation had many unintended consequences for the organisation. Employees encountered numerous implementation challenges throughout the implementation and post-implementation phases. Two years after the implementation, the organisation was still trying to overcome its challenges through a number of coping mechanisms. From the standpoint of stakeholders closely involved with the enterprise solution, the implementation was seen as a failure.

*“This implementation is an absolute failure, not just a failure, an absolute failure” SU4B.*

*“The implementation is a failure because you still have people who are resistant and who are still not using the system” SU3B.*

##### Partial Usage of SAP PPM

Despite the numerous challenges of the enterprise solution, executive management forced usage of the new SAP modules onto the employees. However, the numerous obstacles and limitations of the modules made it difficult for employees to use the modules as intended. Through the subsequent coping mechanisms deployed to overhaul some of the experienced challenges, employees are partially using SAP PPM to comply with instructions emanating from executive management. Consequently, the organisation took the decision to release a new version of SAP PPM to address the core limitations of SAP PPM.

*“We will be rolling out phase 2 of SAP PPM .... If the original implementation would have been done properly, we would not have gone through this exercise of re-implementing the system. So it had to be listed and reflected as a totally new initiative” SU4B.*

### Non-Use of cProjects

cProjects, on the other hand, is no longer being used by the organisation. Employees were forced to use cProjects as their official scheduling tool which, however, was plagued with numerous issues and limitations. The shortcomings could not be resolved through the coping mechanisms employed and, as a result, the tool was categorised as a misfit to the business. Consequently, it was scrapped by the organisation.

*“The reality of the matter is as we speak now, cProjects is out. They will not use cProjects. They are not using cProjects ... it is a pity. I would have liked to see everything within one system. But I understand there are some serious limitations on cProjects” SU4B.*

### A Contrast of the Two Cases

By the time that the last interview of Case A had been conducted, employees from this particular case had established that they would not be using SAP PPM. On the other hand, employees from case B were using both SAP PPM and cProjects during the initial data collection phase. By the end of the data collection phase, they were partially using SAP PPM, and had experimented and used SAP cProjects for a two-year period until it was retired. The next chapter provides a detailed analysis as well as compares and contrasts the challenges experienced by both cases. The identified similarities and differences are subsequently discussed.

## 3.14 Research Summary

To study the ERP implementation challenges faced by a large organisation, the dynamic interplay of the challenges and the coping mechanisms deployed to overhaul the challenges, the researcher undertook an interpretative research stance. A qualitative, inductive approach was used. Through case studies, the researcher’s primary and secondary sources of data came from semi-structured interviews, direct observations and documentary evidence. Numerous analytical techniques were used to analyse the collected data. Moreover, the researcher employed Atlas.Ti as the qualitative analysis software tool to facilitate the analysis and the management of the collected data. Thematic analysis and constant comparative analysis were used to unveil the ERP implementation challenges and coping mechanisms, whereas principles of system dynamics modelling were used to depict a holistic interplay between the different challenges. A summary of the research methodology chapter is provided in Table 3-10.

Table 3-10: Summary of Research Methodology

Research Methodology	Chosen Approach
<b>Research Context</b>	ERP implementation challenges and coping mechanisms in a large, decentralised, public organisation in South Africa
<b>Research Philosophy</b>	Interpretive
<b>Research Theory</b>	Descriptive and explanatory
<b>Research Approach</b>	Inductive
<b>Research Data</b>	Qualitative
<b>Research Time Horizon</b>	Cross-sectional
<b>Research Sampling</b>	Purposive snowballing and theoretical sampling
<b>Research Strategy</b>	Case study (Two cases within one organisation)
<b>Data Sources</b>	Semi-structured interviews, direct observations and documentation
<b>Research Tool</b>	Atlas.Ti
<b>Data Analysis</b>	Thematic analysis, constant comparative analysis and system dynamics modelling

## 4 Unveiling the Enterprise Resource Planning Challenges

This chapter unveils the different ERP implementation challenges faced by employees from the two selected cases through analysis of the data in relation to the following research question: *What are the major challenges faced by public African organisations when implementing an ERP system?*

A number of different challenges were identified throughout the implementation cycle. The challenges have been grouped according to what the employees experienced in the pre-implementation, implementation and post-implementation phases. The findings of this section focus on both cases. Figure 4-1 provides an overview of the high-level categories of the challenges uncovered. The number of occurrences of each challenge is displayed. It should be noted that the number of occurrences and number of empirical observations will be used interchangeably throughout this research.

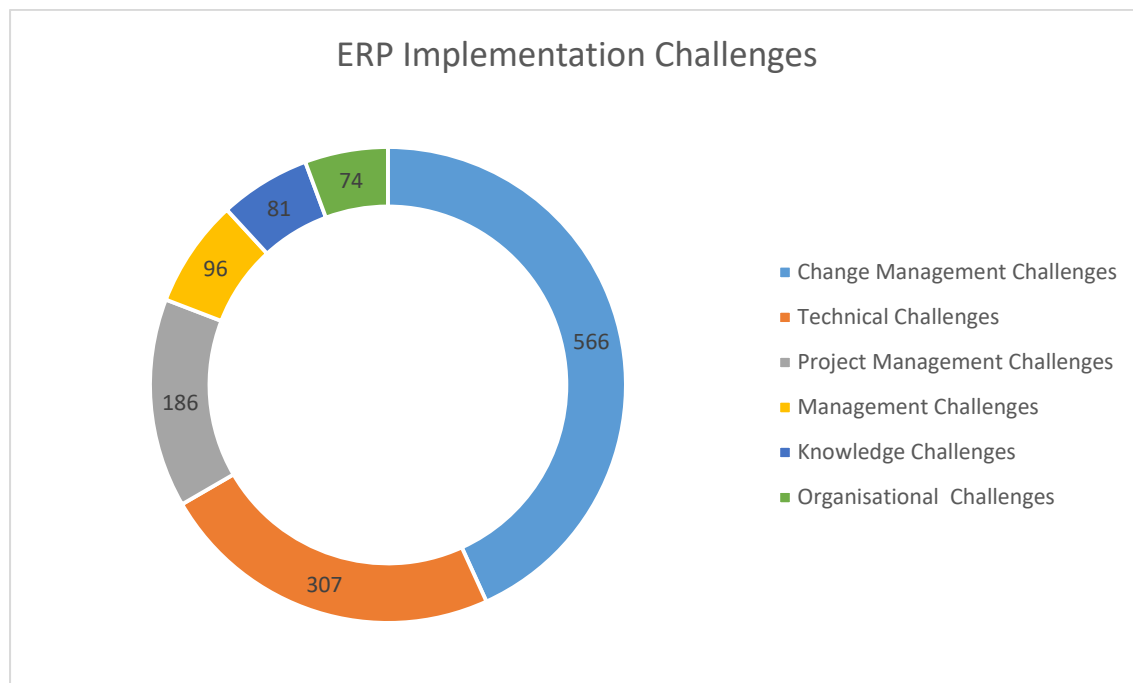


Figure 4-1: High-level Enterprise Systems Implementation Challenges

The challenges have been grouped into change management, technical, project management, organisational, management and knowledge challenges. Change management and technical challenges emerged as the most prominent categories based on number of occurrences. Project management and management challenges were the third and fourth most discussed categories. A significant number of observations relating to knowledge and organisational challenges were also recorded. The major categories of the challenges are referred to as macro-level challenges whilst the medium level categories are referred to as meso-level challenges. Each macro- and meso-level challenge is further discussed in sections 4.1 to 4.6. One of the research objectives of this research is to provide a comparative analysis of the findings between the two cases. Figure 4-2 provides a comparative breakdown of the macro-level challenges as experienced in the two cases.

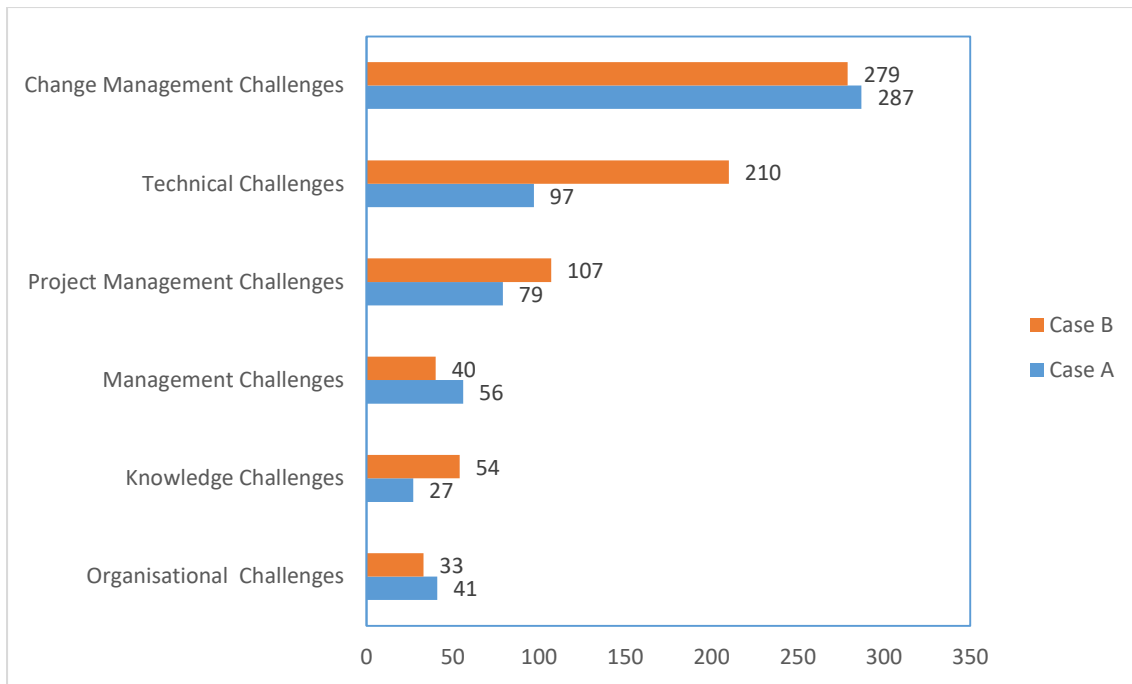


Figure 4-2: Comparative Analysis of Macro-Level Implementation Challenges

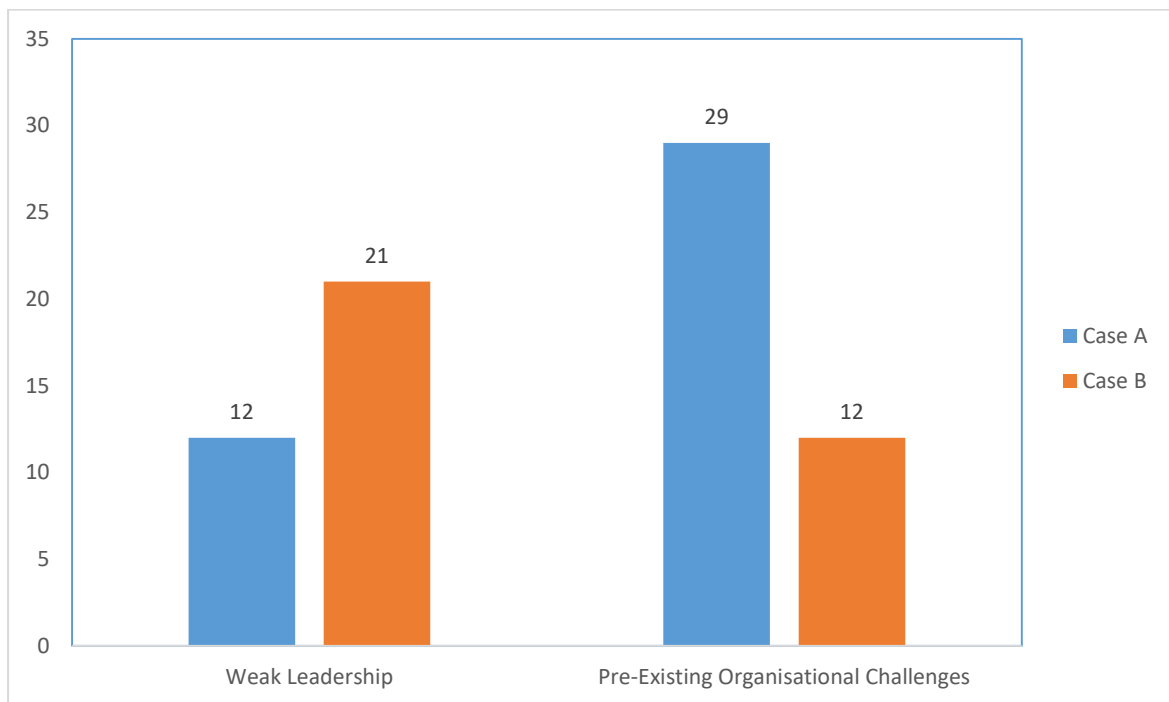
The macro-level challenges were identified in both cases. The number of empirical observations relating to change management challenges were almost equally prevalent in both cases. Technical challenges related to the ERP solutions were discussed substantially more in case B, with almost twice the number of recorded empirical observations. The fact that employees of case B had been using the ERP solutions, with the end-users being more exposed to the different limitations of the solution, as opposed to case A where employees only had limited exposure to the ERP solution, can be one of the reasons accounting for this difference.

While project management and knowledge challenges prevailed more significantly in case B, more empirical observations relating to management and organisational challenges were unveiled in case A.

The subsequent sections provide a comprehensive breakdown of each macro-level challenge in an attempt to explore their significant encompassing meso-level concepts. Where applicable, a comparative analysis comparing and contrasting the different views between the two cases is also undertaken. The organisational challenges are first discussed, followed by the management and project management challenges. Change management challenges, technical and knowledge challenges are subsequently revealed.

#### 4.1 Organisational Challenges

This research unveiled a number of organisational challenges at the forefront of the implementation, as illustrated in Figure 4-3.



*Figure 4-3: Comparative View of Organisational Challenges*

A weak leadership and pre-existing organisational challenges were identified as the prominent meso-level challenges of this category. Weak leadership was more prevalent in case B. Twelve pragmatic observations of weak leadership were uncovered in case A against 21 from case B. With 29 occurrences from case A as opposed to 12 from the case B, pre-existing organisational challenges were more prominent in case A.

#### 4.1.1 Weak Leadership

A weak leadership in this study is characterised by a lack of clear and shared vision and a division and mistrust in leadership. Weak leadership is a noted concern amongst all the different categories of employees.

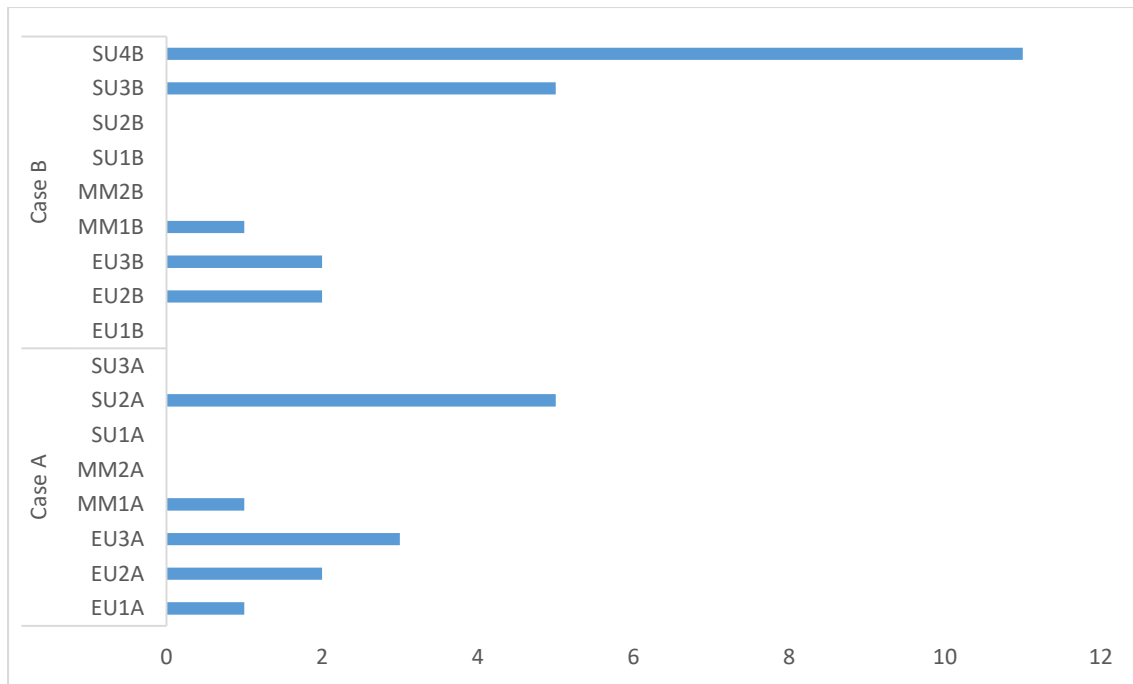


Figure 4-4: Weak Leadership Challenges

### Lack of Clear and Shared Vision

Employees pointed to the unclear and impractical vision from a strategic level. They argued that top management's vision was not translated into practical objectives. Employees did not believe that the chosen solution was the most effective way of achieving the desired outcome and, consequently, the enterprise solution was not deemed a good fit.

*For me, the biggest difference was probably at a strategic level. The vision was not clear" SU3B.*

*"You got certain people's vision of how the system should work or could work that is great in theory but [if you carefully assess the environment] then the vision is not practical ..." SU2A.*

The company vision was also perceived as having a short-term focus. Employees blamed senior management for not conducting any due diligence and risk assessment, which resulted in a lack of understanding of the repercussions of implementing an enterprise solution in such a large diverse organisation.

*"So I think it was a short-sighted vision on the part of senior management. In a small organisation, you can buy an off-shelf solution and put it there. I think the mind-set was to do it the same with [the organisation] without understanding the challenges which the organisation will face with an implementation of such magnitude" SU4B.*

Moreover, employees compared and contrasted a prior ERP implementation, which had been carried out approximately ten years earlier, to the recent one. The prior implementation followed a methodical approach with the objectives clearly defined prior to the implementation process. However, the objectives of the more recent implementation



were perceived as unclear and the enterprise solution was imposed upon the organisation without sufficient justifications.

*“In 1999, the vision was clear, there was a period to prepare, configure, time to plan everything, the upfront planning was good. We were prepared; we had manual contingency plans in process for the dead time periods” SU2B.*

*“2010 was a significantly different approach. We were just told we were going over to SAP, we are re-implementing the system, the vision was impractical ... the system was really put down onto the business” SU4B.*

### Division and Mistrust within the Leadership Team

In addition to the aforementioned issues, the findings also unveiled the division and mistrust within the leadership team. Conflicts of interests between different executives resulted in contradictory messages conveyed throughout the organisation. The power struggle between the Chief Information Officer (CIO) and the Chief Financial Officer (CFO) did not go unnoticed. While the CFO stated that all business units should be using SAP for budget allocation, the CIO informed the business that the IT department would only support an alternate Oracle tool, leaving the employees further confused about which tool they should be using.

*“So now the Chief Information Officer, CIO is saying this [Oracle software] is the only scheduling tool you will use, nothing else, we are switching off everything else. And the chief financial officer will say, if you want to make sure you are allocated any budget, you must show me your [SAP] schedule” SU4B.*

Furthermore, the decisions made by executive management were not transparent, leading to situations where employees were not provided with clear justifications for any major changes.

*“Things are not always clear, sometimes changes are approved without a signature from people who should be signing and approving them. In actual fact, based on end-users opinion, changes which have been rejected are still approved. Invariably, what was requested and what was delivered is not the same thing” SU2A.*

Consequently, employees did not trust executive management's vision and strategies. They questioned the decisions undertaken by executive management; they became critical and apprehensive of any organisational-related strategies.

*“I know the strategies, if they are on the right track, it's always questionable” EU3A.*

*“We are often faced with implementation strategies and objectives which we question; an example would be the implementation of SAP” MM1A.*

Employees questioned the rationalisation of the new enterprise solution. Despite executive management’s claims for a strategic need of a centralised source of data, they were convinced that in the end, they would be required to revert to previous ways.

*“Better vision for management? But management never looks at things like that. They come and ask you ... but why do they want to see that! They still need to ask us, ok, please provide the information” EU3A.*

#### 4.1.2 Pre-Existing Organisational Challenges

The pre-existing organisational challenges, depicted in Figure 4-5, record all instances where the employees discussed the prevailing financial difficulty and staff shortage the organisation was facing, and the lack of uniform practices between the different business units. While a lack of uniform practices was discussed by participants from both cases, the prevailing financial difficulty and staff shortage were predominantly addressed by participants from case A.

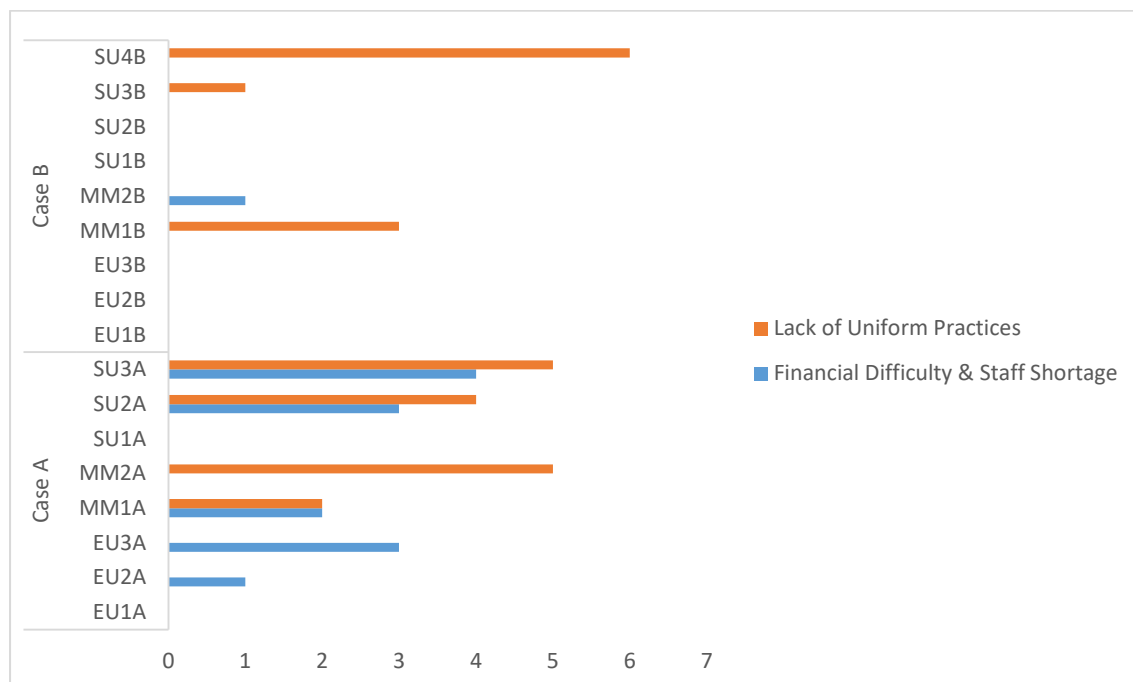


Figure 4-5: Pre-Existing Organisational Challenges

#### Financial Difficulty

Interestingly, the organisation’s decision to implement the enterprise solution was due to the major financial difficulty it was experiencing at that time.

*“The main driver for the ERP system was the financial crux that the organisation experienced a few years ago...” SU3A.*

The financial difficulty implied that the organisation did not have the required finance to sustain its major undertakings. The organisation needed to react speedily to the cost pressures it was facing.

*“... We were pressed hard to find a solution to allow us to source for funds for our critical projects” MM1B.*

In order to increase the visibility of all projects and in an attempt to prioritise and allocate funds to critical areas needing investment, the need for a holistic system was identified. The organisation required a centralised and integrated source of information in order to sustain critical projects, thus a decision to implement an enterprise solution was made.

*“... Basically, we had a funding shortage and we had to prioritise areas that needed investment. A holistic ERP solution was required so we could have a better visibility of all projects within the environment and have information such that we can drive these projects and ensure that [the organisation] has a sustainable business” SU3A.*

The ERP solution was therefore considered to be one of the options to address the funding shortage. The consolidated projects in an enterprise solution would allow the organisation to prioritise its major projects and source the required funding.

*“So our projects are then captured and consolidated in the PPM system. Based on the funding requirements of these projects, the finance guys will go out and source finance for [the organisation]” SU3A.*

#### Staff shortage

Staff shortage was perceived as a major challenge in case A. The empirical findings depict that employees from case A were visibly understaffed. End-users asserted that they were already struggling with an existing high workload due to the resource limitations and the enterprise systems implementation only added to their workload. Consequently, they could not dedicate any time to experiment with the enterprise solution.

*“We have limited resources, we already cannot do everything and now, they are just loading extra work on us ...” EU3A.*

*“We are supposed to be using SAP PPM, we have not because of our staff shortage, until then, we decided not to load the projects under PPM” MM1A.*

#### Lack of Uniform Practices

The case organisation is a large organisation operating with different business units. Through the interviews, it became apparent that the different business units operate as silos and each business unit has its own unique practices and requirements.

*“The work that you perform in the DX and GX divisions is different. It varies. Our work is not the same. Our requirements are not the same” SU4B.*

Moreover, each individual business unit has numerous decentralised regional centres across the different provinces. Differences exist within those centres as well, with each regional centre operating in a diverse way.

*“Earlier, I used to work in [this other province] as well. So I have got first-hand experience on how the regions are just completely different. We generally do things in different ways, hence the national centre of excellence is trying to standardise processes. But, if you go to any province, the processes look different” MM2A.*

*“Yes, so there's probably about six different ways of doing it within this particular business unit” MM1A.*

Enterprise solutions dictate a standardised way of operation and the different business units are expected to abide by the designated process. One of the objectives of the implementation was, primarily, a means to standardise the different processes in order to achieve a certain degree of standardisation amongst the different business units. However, due to their diverse nature of doing business and noted cultural differences, processes and IT applications were not used uniformly as intended.

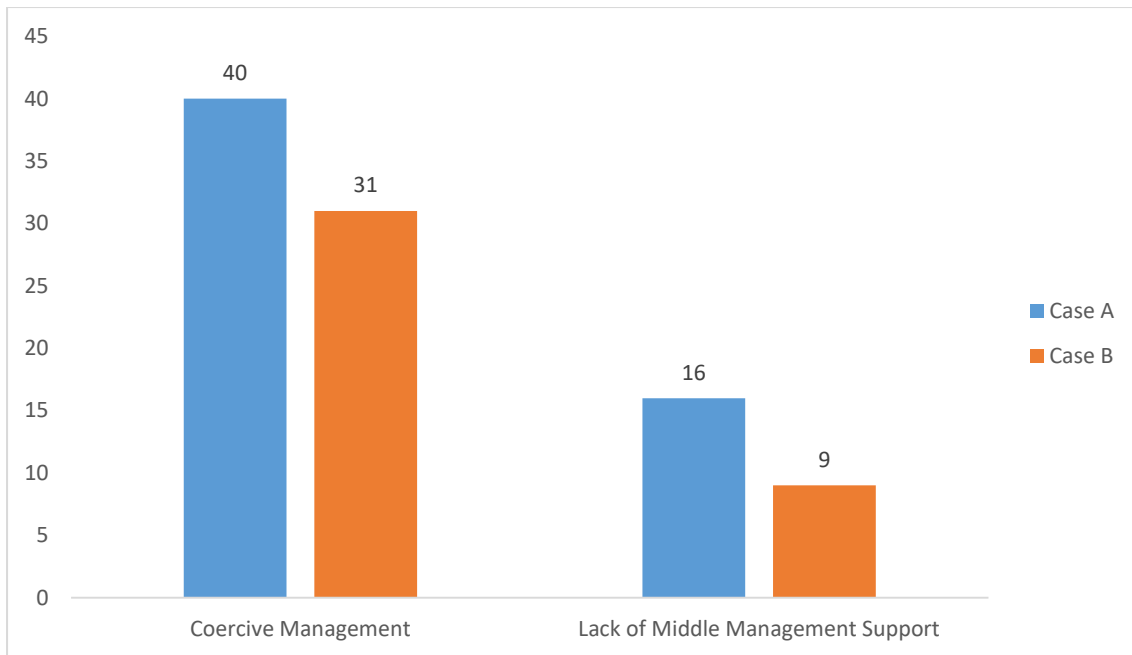
*“What we noticed is that the enterprise solution prescribes an expected way of use but due to differences in culture in different areas of [the organisation], we find that the different units do not use any system in a common way” SU3A.*

Seeking a shared understanding, therefore, became one of the most daunting tasks as different business units were hardly concerned or aware of the requirements and processes of their counterparts.

*“Unfortunately, and I think it is a problem larger than what we realise. Departments essentially are silos, they operate independently, and they do not really understand what is required by other sections in other departments. The biggest challenge that we have is to get understanding across the table; what is the common need across [the organisation] ...” SU3A.*

## 4.2 Management Challenges

Key management concerns refer to a lack of middle management support and the authority of top management. Top management's authority is labelled as coercive management in this research as employees argue that the change was forced onto them. Figure 4-6 illustrates the prevalence of these themes.



*Figure 4-6: Comparative View of Management Challenges*

Coercive management emerged as the most significant challenge of this grouping, with users at all levels acknowledging the issue. Forty key occurrences were distinguished in case A and 31 in case B. Similarly, a lack of middle management support was discussed in both cases with 16 key observations in case A against nine from case B.

#### 4.2.1 Coercive Management

Coercive management refers to all instances where employees discussed the authoritative power of executive management to force usage of the SAP solution. Numerous instances of coercive management were discussed by middle-level management from both cases. End-users and super-users echoed similar arguments, hence all three categories of respondents discussed their concerns relating to coercive management as depicted in Figure 4-7.

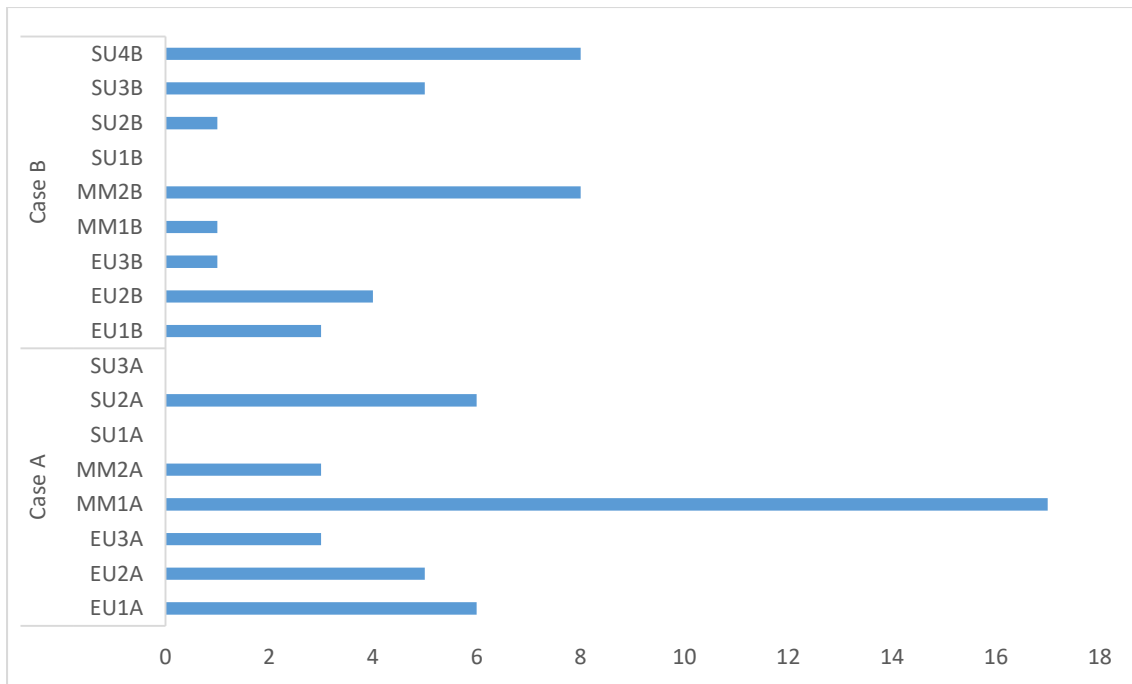


Figure 4-7: Coercive Management

Employees provided numerous examples where organisational changes were imposed upon employees and where they were expected to accept and comply with poor quality solutions. Software solutions which were seen as sub-standard, with no direct benefit to employees, were forced upon them. Employees emphasised that they were obligated to use software solutions that did not function as intended.

*“... we have been forced to use the system ... I am not ok with it. It will surely affect my productivity if I am forced to use it” EU2A.*

*“It is very demotivating if you are forced to use it a tool that is not working properly” EU3A.*

Employees stressed that they were only using the ERP solutions because they had been instructed and compelled by executive management. Given a choice, they would not have used the existing solution in its current state.

*“I would not have used SAP PPM at all as it stands, I am only using it to comply with instructions from nationals” MM1B.*

*“It came to the point where the business said if there is no SAP schedule, we won’t have budget allocated to it. So we were kind of forced to do it, but it was only done to get budget allocated to the project” EU2B.*

Employees further discussed the authoritative power of executive management and the fear of the different business units to stand up to executive management. Although employees could see that the ERP solutions were not suitable solutions, they were too apprehensive to challenge executive management’s decision.

*“Where we sat we could see the problems, we could see the pitfalls, we could see the major gaps and we just could not understand why higher than us this was not seen. The impression that we got was although that it was seen, no one was prepared to challenge it ... you could see we will run into problems. ... Like I said, it did not seem like anyone had the stomach to fight this” SU4B.*

An interesting observation, from this category, is the prominence of this theme arising from case A’s middle manager from the western region; he explicitly expressed his disapproval of forcing a non-functional enterprise solution through a top-down management approach. In comparison, fewer key observations of this situation were made by middle-level management from case B. End-users and support-users from case B, however, raised their concerns with this particular type of management approach.

*“PPM comes as a one-way communication from top-down. I think they wanted to get it implemented quickly, so they just did it quickly to push it down there. There is a lot of compliance with systems, we are forced to use systems prematurely and I am very reluctant to start using it until it's working properly” MM1A.*

Employees from case B further asserted that, despite numerous issues, they were nevertheless required to adapt and use the ERP solution, owing to executive management’s determination to migrate to the new solution.

*“I know that in the business, the change was not easy for everyone but we had to adapt to the change because we had to use it and we were forced to change and all the information in the system had to be aligned to the new structure” EU1B.*

#### 4.2.2 Lack of Middle Management Support

A distinctive finding pertaining to this research relates to the lack of middle management support of the implemented solution, despite the authority and power of executive management. Contrasting behaviours are noted in both cases, as shown in Figure 4-8.

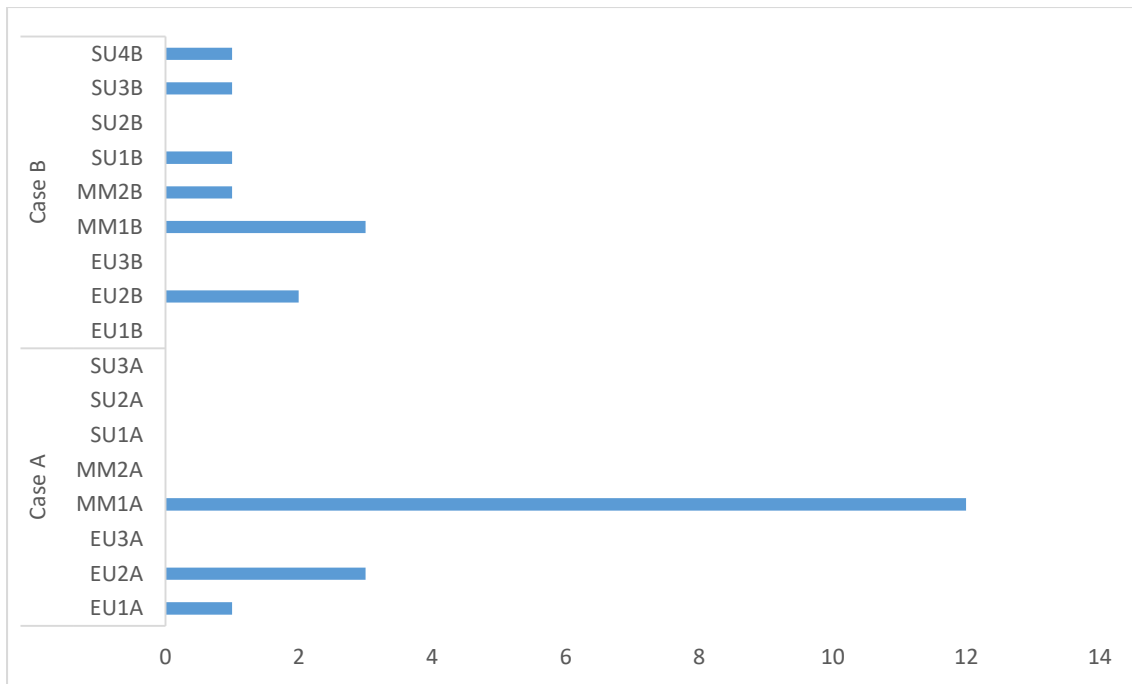


Figure 4-8: Lack of Middle Management Support

Although middle management initially believed in executive management's vision of the enterprise solution, they did not support the final solution that was implemented. The enterprise system did not meet their requirements and did not deliver according to their expectations, leading to middle-level management's lack of support and commitment towards the change.

*"Initially, managers had the buy-in for the system but they did not have the buy-in for the ultimate system that came on board because it did not really perform as what was initially negotiated ..." MM1B.*

*"We were very excited about the system initially. I was very excited until up to three or four months ago still and that is more than a year and six months down the line" MM2B.*

Consequently, middle management from case A exerted a strong resistance to the implemented enterprise solution through non-compliance with executive management's imposition of the system and by not participating in any change-related initiatives.

*"Yes, it was my decision not to go on training as I knew I was not going to start using the system. I knew at that time already that they required us to enter data on two different systems. But I, from [forecasting], I have been reluctant to use it" MM1A.*

Nevertheless, use of the enterprise solution was a necessity for any budget approvals and allocations. Middle management from case A negotiated and reached an agreement with middle management from case B, whereby employees from case B would be capturing information obtained from case A onto SAP PPM.



*"... But there are other people in [implementation] who take the information from my access DB and they put the core, or minimum required fields into PPM. So actually, they are populating SAP PPM for me"* MM1A.

*"I would say [forecasting] must use it, in fact, everyone must use SAP PPM. In other words, when a project starts they would be initiated in SAP PPM and people who currently initiate projects are from [forecasting], so they need to use the system ... but for now, we do the initiations ourselves"* MM1B.

In contrast, middle management from case B, despite their disapproval of the ERP solution, encouraged their employees to use the solution. Consequently, end-users from case B emphasised that middle management had forced them to use the system without trying to understand its limitations and impact on the business.

*"Management were not very involved and supportive at all. Both top and middle management. Middle management accepted what was instructed from the top and kind of forced that down to be implemented the bottom"* EU2B.

In effect, employees from case B perceived middle management from Case A as being strong and assertive as they did not succumb to executive's management pressure.

*"[Forecasting] has strong managers that indicated they are not going to duplicate the effort in the systems and executive management must either shut down one system for them to start using the other system"* SU1B.

Further probing revealed that middle management from case B only complied with top management's instructions to prevent any conflicts with executive management.

*"To keep out of trouble, that's all ... so whatever instructions head office gives, we comply with ..."* MM1B.

*"People in influential positions, people in senior and middle management positions were scared and not prepared to stand up and challenge to that individual ..."* SU4B.

### 4.3 Project Management

The project management challenges were grouped into six main sub-categories, namely, time and cost constraints, personnel constraints, project planning and scoping constraints, poor implementation strategy and lack of process redesign. Figure 4-9 reports on the comparative breakdown on the number of empirical observations emerging from this category.

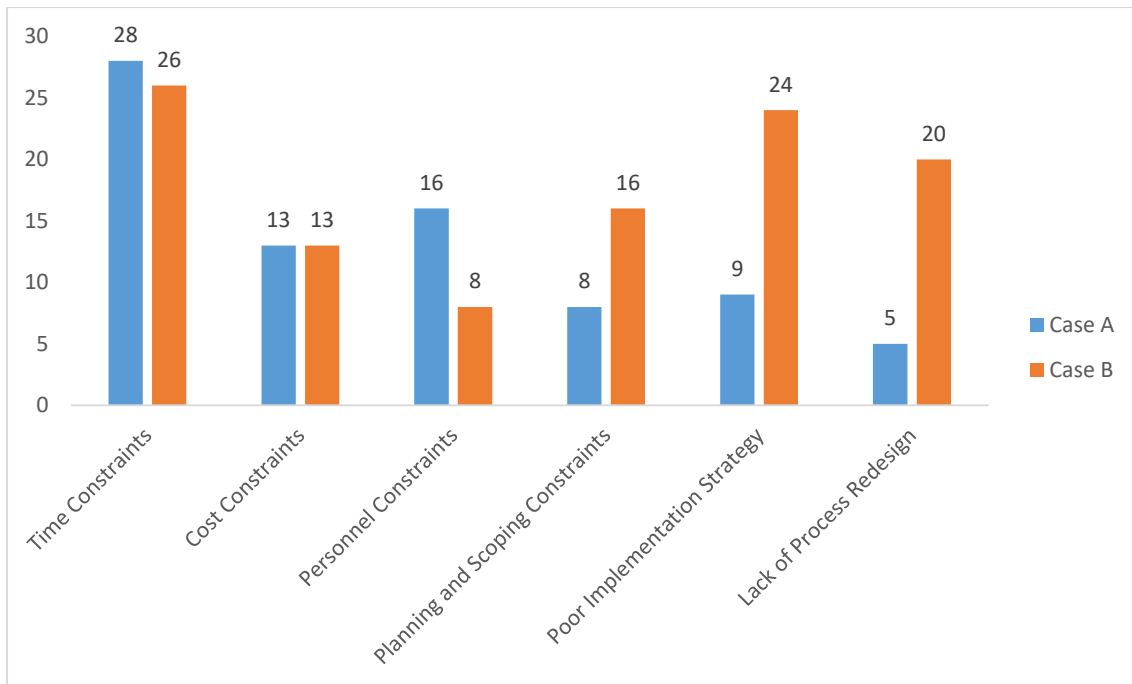


Figure 4-9: Comparative View of the Project Management Challenges

Both cases referred to the above-mentioned challenges. Setting the right timelines while managing the budget, and sourcing and involving the required project personnel, were identified as the major project resource challenges throughout the implementation cycle. Time constraints emerged as the top project management challenge. Time constraints prevailed significantly in both cases with 28 empirical observations made in case A and 26 in case B. Likewise, cost constraints were debated in both cases, with 13 respective observations from each case. Personnel constraints were more prevalent in case A with 16 empirical observations and only eight emerging from case B. With 16 occurrences from case B as opposed to only eight from case A, planning and scoping constraints were discussed more in case B. Nine empirical observations from case A related to poor implementation strategy as compared to 24 from case B. Five instances of lack of process redesign were discovered in case A against 20 from case B.

#### 4.3.1 Time Constraints

This theme records the lengthy implementation lifecycle of an enterprise solution and the time constraints arising from the unrealistic timelines allocated to different implementation activities. Time constraints were discussed by all three categories of participants, as seen in Figure 4-10.

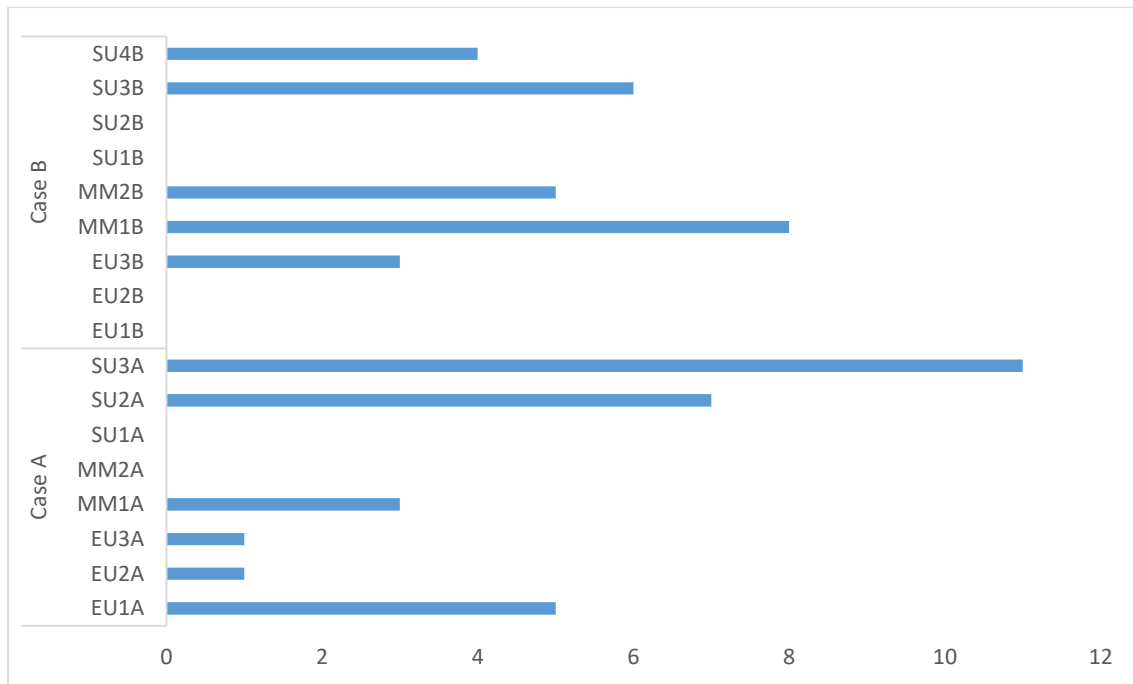


Figure 4-10: Time Constraints

Employees reasoned that in a large organisation, projects can take a very long time to be accomplished. At times, the duration of a full project implementation cycle may be from five to eight years.

*“Unfortunately for systems like SAP or something that is massive in terms of roll out, these projects run from 5 to 8 years ...” SU3A.*

However, employees alleged that the SAP implementation project did not follow the system development lifecycle as defined by the organisation. Respondents believed that the project timelines allocated to project activities were compressed, unrealistic and unachievable.

*“The implementation and roll out did not follow proper system development processes and timelines which are well documented for the organisation. The project timelines were completely squashed ...” MM1B.*

The organisation rushed the implementation of the new SAP solutions. Consequently, the post implementation phase became a lengthy project on its own.

*“Due to the rushed implementation, post implementation becomes another mini project on its own. You are still doing development ... so we are doing changes to the system as the system is running” MM1B.*

According to the participants, the organisation had struggled to schedule realistic timelines with regard to project activities. In an ideal environment, the set timelines could have been achievable but, in the actual complex environment, this is seldom attainable.

*“That is the problem, the management of time is not done properly, timelines are not realistic” SU3B.*

*“But unfortunately, those timelines were not achievable ... that would have happened in an ideal scenario” SU2A.*

In the pre-implementation phase, external consultants were not assigned sufficient time to understand critical business requirements.

*“... then there was not time for the consultants and developers to interact with the business ... because of the time constraints that were given to them by the head office to implement this module by specific time” MM2B.*

Furthermore, the configuration and implementation of the solution was hastened to achieve the key milestones set out by head office. The unrealistic timelines implied that none of the stakeholders including the developers, testers, trainers and end-users were ready at the time of implementation. In-house trainers were not allocated adequate time to learn and understand the system. In-house trainers were only given a brief exposure to the enterprise solution a few days prior to delivering the training to end-users. During this short duration, they were expected to fully understand the system to be able to carry out various trainings in different locations.

*“We were trained three days prior to giving the training ...” SU3B.*

Training and implementation roll-out happened almost simultaneously. Employees were forced to undergo organisation wide training to comply with the set milestones and management policies. They felt that the purpose of the rushed training was merely to ensure that the training was executed by the established deadline.

*So was it a matter of being trained up just for the paperwork to be ticked off to say everyone has been trained” EU1A.*

*“The SAP implementation is going on at the same time, there was this whole rush, so from top management, it was like by this date we should all have been using SAP” EU1A.*

End-users were not allocated much time to learn and experiment with the new processes and enterprise solutions. The training was deemed inadequate.

*“There was not an adequate training given for the new system ... the timing of the training where you are just implementing the training two to three days before the roll out. It does not work” EU3B.*

The new modules were rolled out before the organisation wide training, implying that there was not enough time dedicated to solve data errors, functionality mismatches and performance issues after the training. Insufficient time was allocated to testing and troubleshooting activities, as a result of which a number of data errors and performance issues were unveiled when the solution was deployed.

*“The new modules were implemented already. They were running already, so as soon as you get trained, you get access to the system, there was no time allocated to fix errors and test performance issues” MM1B.*

### 4.3.2 Cost Constraints

In the context of this study, cost constraints include instances where employees discussed the implications of a limited budget on the organisation and the respective implementation activities. This theme was discussed mostly by middle management and super-users, as seen in Figure 4-11.

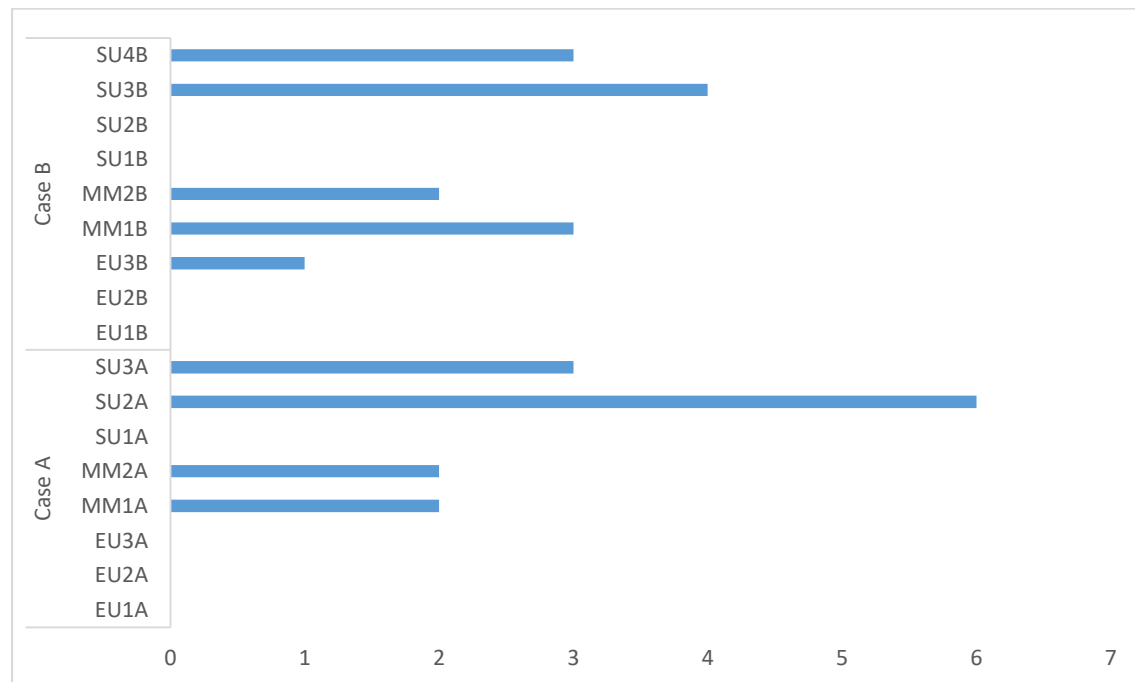


Figure 4-11: Cost Constraints

Once the implementation was initiated, numerous cost-related issues surfaced and rippled through all the different phases of implementation, impacting the overall project in many ways. Cost implications resulted in the freezing of existing project initiatives. Cost-intensive projects that were not deemed critical were delayed indefinitely.

*“My understanding is that there was supposed to be a project initiation portion to PPM as well, which I understand is not being created and will not be looked at with the budget cuts” SU2A.*

Moreover, sourcing of skilled contractors and consultants for long durations proved to be too costly for the organisation. Owing to the high cost of skilled personnel, the organisation had not been able to source external consultants with specialised skills, hence impacting the progress and quality of a number of projects.

*“Specialised skills are scarce ... and we don’t have the money to pay the consultants because they are so few. You are left with people that are not producing high-quality software” SU2A.*

Other strategic decisions included the non-renewal of consultants' permits and restriction of travel budgets. Off-location meetings and projects requiring extensive travelling budgets were restrained.

*"Due to the budget constraints, they will let the consultants go ..." SU3B.*

*"I have not attended these meetings lately because we do have a restriction on travel ..." SU1A.*

### 4.3.3 Personnel Constraints

Personnel constraints include the unavailability of skilled project personnel, the poor selection of the project team and the lack of adequate resources allocated to crucial tasks. Numerous personnel constraints were highlighted by participants from both cases as depicted in Figure 4-12.

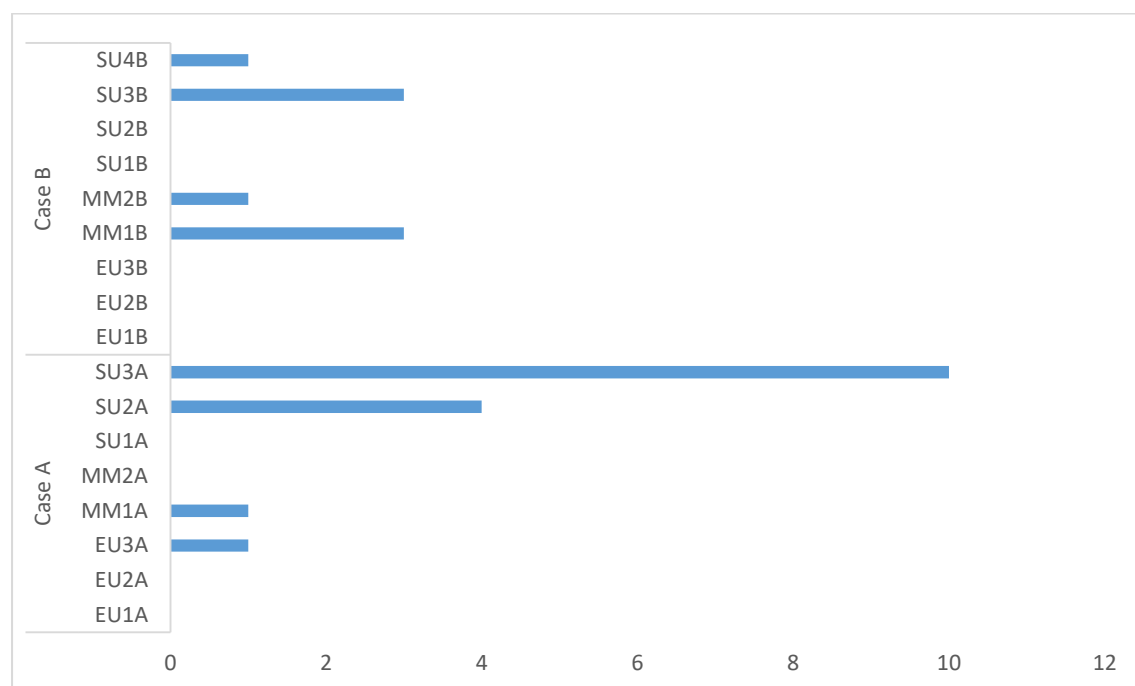


Figure 4-12: Personnel Constraints

Resources were constrained. The unavailability of in-house skilled personnel who were able to accurately understand and produce quality output was a noted concern.

*"... so, internally, there is not enough skills available to deliver what is required" SU3A.*

The identified resource gap adds an additional level of complexity when critical projects need to be implemented. A consolidated ERP solution would have been a good solution but, with the existing resource limitations faced by the organisation, it was certainly not a practical one.

*“Something like PPM could work great in theory but if you take the resources that are required and the resources that you actually have available to fulfil the role, possibly not practical” SU2A.*

Employees discussed the lack of skilled in-house personnel trained to support the implemented ERP solutions. While their national IT unit should have been available to provide the required support to different operating units during the implementation, they were themselves struggling to cope with their workload, as they were understaffed throughout the implementation period.

*“The national IM unit must support the system but they are very understaffed ... and they were understaffed during this implementation ... so they are struggling as well” SU2B.*

Moreover, the project team was not seen as a well-balanced team. Employees criticised the organisation’s decision to rely exclusively on consultants and to limit end-users’ involvement.

*“Another reason why we went seriously wrong is because the people who were involved in providing the solution were all external people, all consultants ... it would have been a little bit more successful had there been in-house people involved” SU4B.*

Sourcing external skilled people who can understand the organisation’s processes and needs and, subsequently, translate the requirements to formal system functionalities, proved to be a constant hindrance. According to the respondents, converting engineering requirements to technical requirements required specialised skills which were particularly lacking throughout the implementation cycle.

*“... It is always difficult to integrate engineering interpretation into code. If you get a consultant who only understands the system to interpret and understand an engineering output, which on its own is already difficult, is just an additional challenge” SU2A.*

#### 4.3.4 Planning and Scoping Constraints

Planning and scoping constraints were discussed by all three categories of participants from case B whereas only support users from case A referred to this challenge. This is depicted in Figure 4-13.

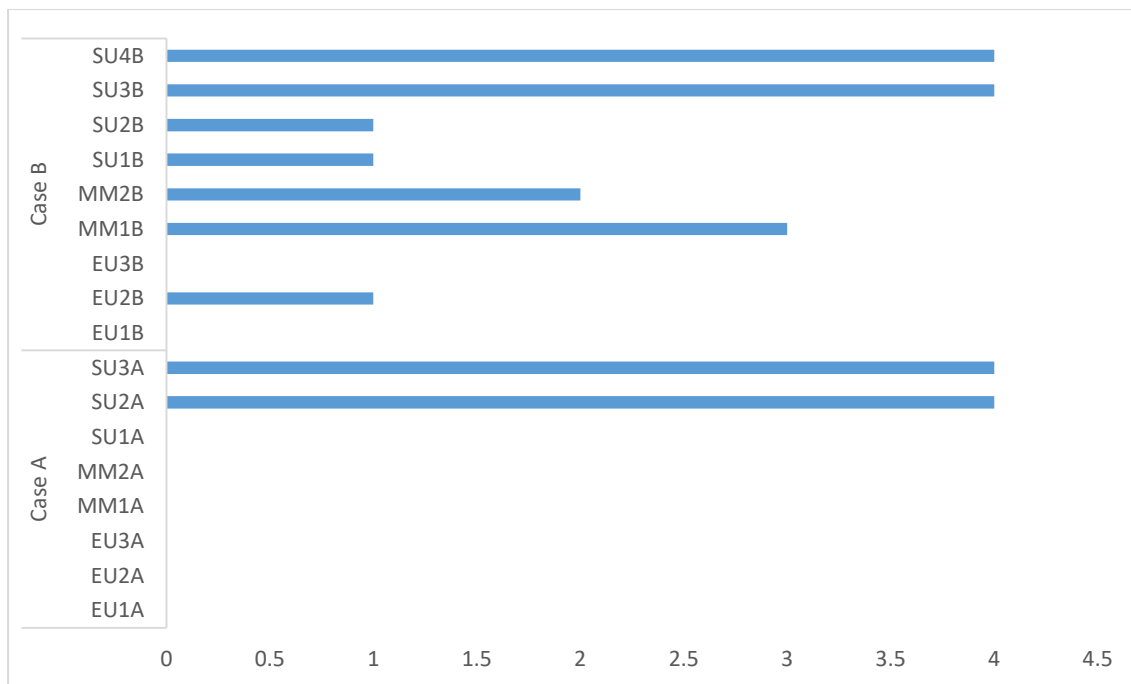


Figure 4-13: Planning and Scoping Constraints

### Planning Constraints

Employees referred to many cases where the implementation cycle was not adequately planned. They emphasised that the organisation did not invest enough time in planning activities. Planning should have been meticulous to ensure a subsequent smooth implementation lifecycle. With adequate planning, the implementation challenges could have been tackled more efficiently. The organisation chose to implement the enterprise system without any upfront planning.

*“You either plan for failure or you plan for success and planning should take 80% of your time and deliveries 20%. If we get planning right, we do our work properly, your delivery should be very easy. We will always have challenges and issues but it should not be as problematic if your planning is done well. And you plan for success. In this case, there was not any planning. It was just implementation and roll-out” SU4B.*

*“But if they had a proper process of up-front planning in place, like how we can do this and the subsequent roll-out, then it could have gone much better” EU3B.*

The planning did not cater for core activities such as seeking stakeholders’ buy-in, process redesign, gathering of user requirements, sourcing of key talent, understanding of core business processes, planning of training logistics and testing of the solution.

*“There was no planning, no proper training, no proper business involvement, the system was really put down onto the business, people did not understand the system, people did not know how to work with the system” SU4B.*



*“The planning period to prepare, configure, to train, to test, to retest, to reconfigure, was not good” SU2B.*

Employees further stressed that the planning was so poorly organised that operational activities conducted were carried out incorrectly. For instance, incorrect user-groups were targeted for the training.

*“We found that instead of training A and B, we were training Y and Z. And that is how bad it was. All of this was because the planning was not done properly here” SU3B.*

Moreover, employees were apprehensive of the project plans put forward by the consultants, as they believed they were unrealistic and could not be easily achieved.

*“So what they planned was not practical, we could see that the reality and what they were presenting was something totally different. ... They had huge plans” MM2B.*

*“There were different phases that they were busy developing, phase two, three, four ... we are still in phase one, we could see it was too optimistic” SU2B.*

### Scoping Constraints

In terms of scope, the SAP vanilla implementation was described as a poor fit to the organisation. The SAP vanilla solution was seen as a poorly scoped solution which resulted in the non-delivery of numerous customised functionalities.

*“When the individual came in, he said we will put down SAP vanilla. You will work in SAP vanilla. And we said, given the understanding of the business, we cannot. We will have to do a little bit of reconfiguration and that was not allowed. So you could not satisfy the requirements of the whole different businesses” SU4B.*

Moreover, employees asserted that desired scope of the solution was compromised since core functionalities originally agreed on were not translated into the implemented solution. For instance, the original scope of the implementation included an integration phase which was subsequently shelved.

*“The actual scope does not cater for a lot of the things that are asked for. ... SAP was supposed to be integrated with the other systems and integration was not delivered” SU2A.*

Furthermore, at times, particularly with ERP systems, employees stated that because of the long implementation lifecycles of these projects, the scope of the projects was often obsolete by the time the full functionality of the system was achieved.

*“I am aware of many projects that were ready but were scrapped because of the scope and timelines of the project. A lot of projects that had*

*timelines of over eight years were not considered to be valuable anymore”*  
 SU3A.

#### 4.3.5 Poor Implementation Strategy

A poor implementation strategy records all instances where employees discussed the rushed and poorly conceived implementation strategy and approach undertaken by the organisation. Employees at all levels criticised the poor implementation strategy as illustrated in Figure 4-14.

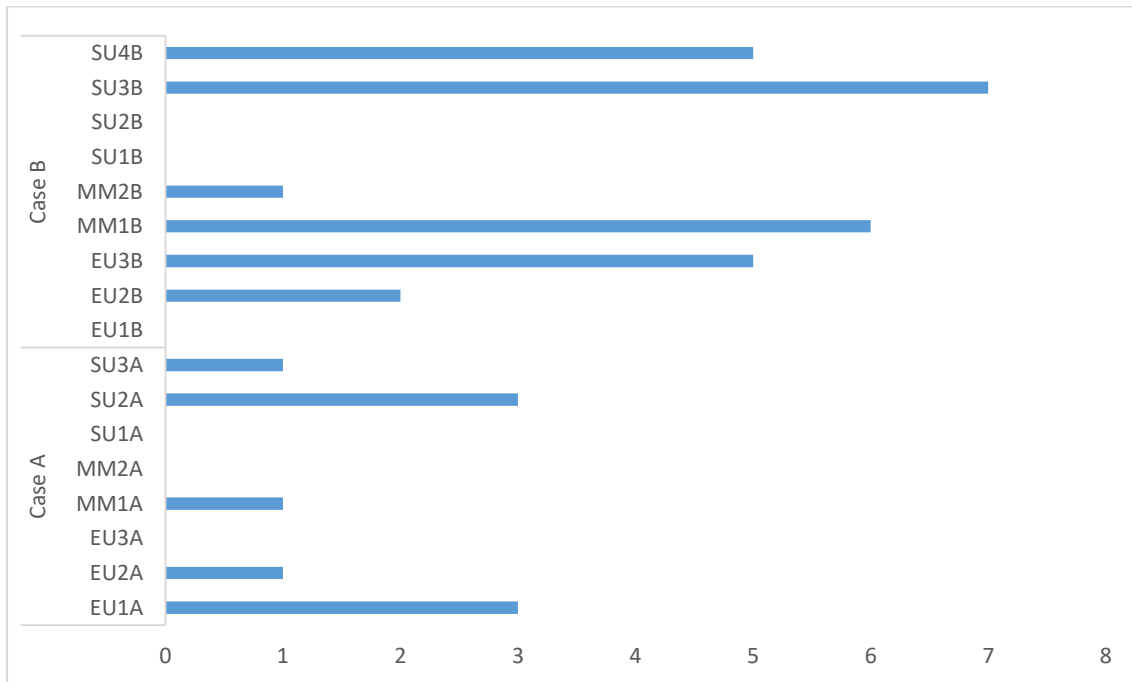


Figure 4-14: Poor Implementation Strategy

To begin with, employees discussed the poor implementation approach the organisation had adopted to implement the new enterprise solution. The organisation’s vision of using a singular SAP vanilla solution to address its organisational inefficiencies and cater for most of its business needs was criticised by the employees who felt that the chosen approach was not ideal.

*“I think it is also the basic approach that the organisation is using. You are trying to implement an enterprise system to address 90% of the needs of business. But based on my experiences this is sort of a wrong approach to use”* SU3A.

The organisation opted for a rushed implementation strategy. Employees believed that the enterprise solution itself was not to blame but, rather the onus was on the chosen implementation strategy.

*“The implementation was rushed and the roll-out was of very short duration”* MM1B.

*“They wanted to get the enterprise system implemented quickly, so they opted for a quick implementation strategy” MM1A.*

*“In no way, am I saying there is a problem with SAP ... but it is the selected implementation approach we went through to roll out the new system. That was where the challenges were” SU4B.*

Employees reasoned that an implementation of such magnitude could not simply be rushed. The implementation of the enterprise solution was hastily deployed with little consideration of the effects and consequences, towards which employees were vocally critical.

*“You can never fast track the implementation of an ERP. You will end up having lots of gaps; you will end up having an empty skeleton, wasted money which provides nothing but rubbish information at the end of the day. And that is the reality of the thing” SU3B.*

Consequently, employees had to bear the brunt of a badly executed implementation. They were convinced that the implementation did not work as intended and classified the latter as a chaotic process.

*“I think the whole implementation process was badly executed and we are feeling the effects of a bad implementation” MM1B.*

*“We as employees who are using the system know that the implementation has not been executed in an appropriate way, it was a big mess basically” EU2B.*

Moreover, employees also compared the ERP implementation strategy to a previous ERP implementation carried out a decade ago. Employees felt that the earlier implementation was carefully planned, with realistic timelines dedicated to each significant milestone activity such as sourcing user requirements, system configuration, data migration, system testing and training. The recent implementation had no such methodical approach, leading to a sub-standard solution that lacked core functionalities and did not cater for users' needs.

*“The time to plan everything, the up-front planning, the up-front configuration of the system for different disciplines like DX, GX, TX was good. We were prepared, we had manual contingency plans in process for the dead time periods, the shut-down of the old system, living up SAP, transferring data and still running the business until we were fully live. And then the recapture of the manual work back into the SAP system and training was done way upfront” SU2B.*

#### 4.3.6 Lack of Process Redesign

Lack of process redesign chronicles all instances where the organisation's decision to shun the reengineering of the processes, was raised by the participants. This theme was more prevalent in case B as depicted in Figure 4-15.

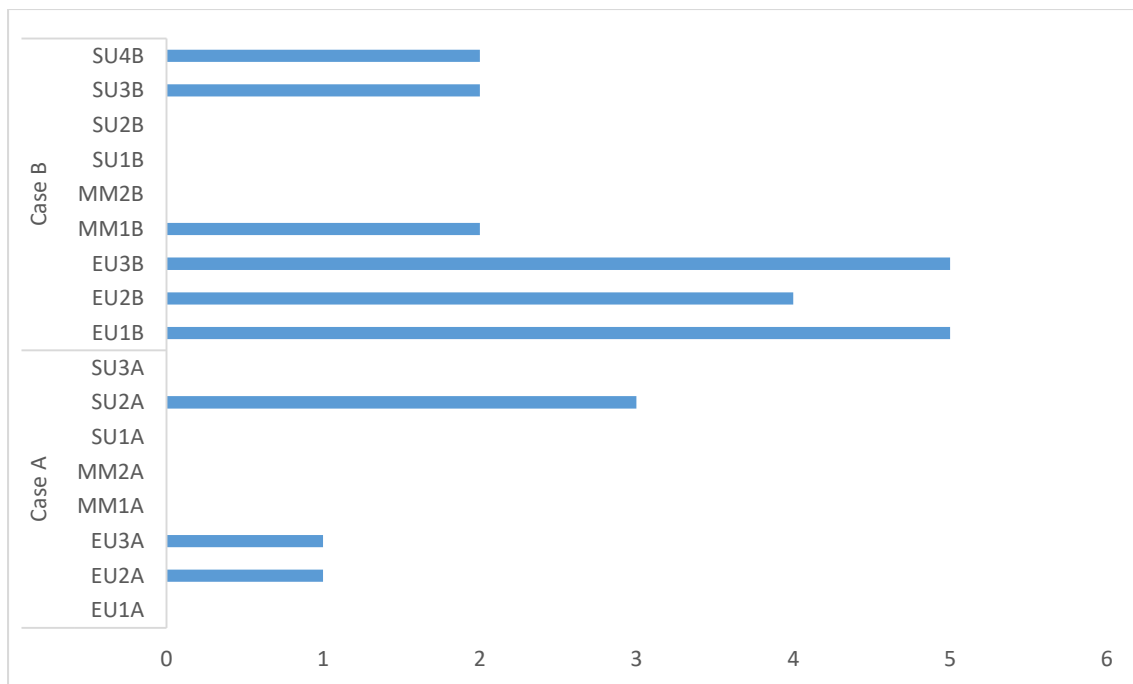


Figure 4-15: Lack of Process Redesign

The organisation chose not to redesign and remodel its business processes before proceeding with the implementation of the SAP vanilla solution.

*“The individual said we will work in SAP vanilla ... no process redesign and system configuration were not allowed” SU4B.*

The lack of redesign of the existing processes led to the emergence of new processes which were, unfortunately, not designed to function optimally when compared to the previously existing processes. The resultant new processes were understandably more cumbersome and it took employees much longer to complete a task which could have been achieved effortlessly through their previous legacy solutions.

*“The crucial thing in this adoption is that despite the potential positives and disregarding the negatives that could be there, it is a more time-consuming process. The methods that they have implemented are not practical and are more cumbersome, so you cannot achieve your output quickly and easily. If it was the quickest and easiest way to do something, people would adopt it” SU2A.*

Processes which could be completed without much difficulty seemed increasingly complex in the new solution. Moreover, participants claimed they had to adhere to a particular standard technique to complete their tasks whereas, with the previous applications, they could choose their preferred and most efficient techniques to achieve the desired result.

*“It is not a practical, easy to use system; there are easier ways to achieve the same output” SU2A.*

*“The processes that we now follow take longer, there is no flexibility. It is more time-consuming” SU3B.*

#### 4.4 Change Management Challenges

The interviews exposed a number of change management challenges which were grouped into the following meso-level themes, as depicted in Figure 4-16. Sub-optimal training, resistance to change, lack of perceived change benefit and value, and low employee morale emerged as the four most prominent categories in this grouping. Other key categories included inadequate user requirement, ineffective change management initiatives and inadequate user involvement.

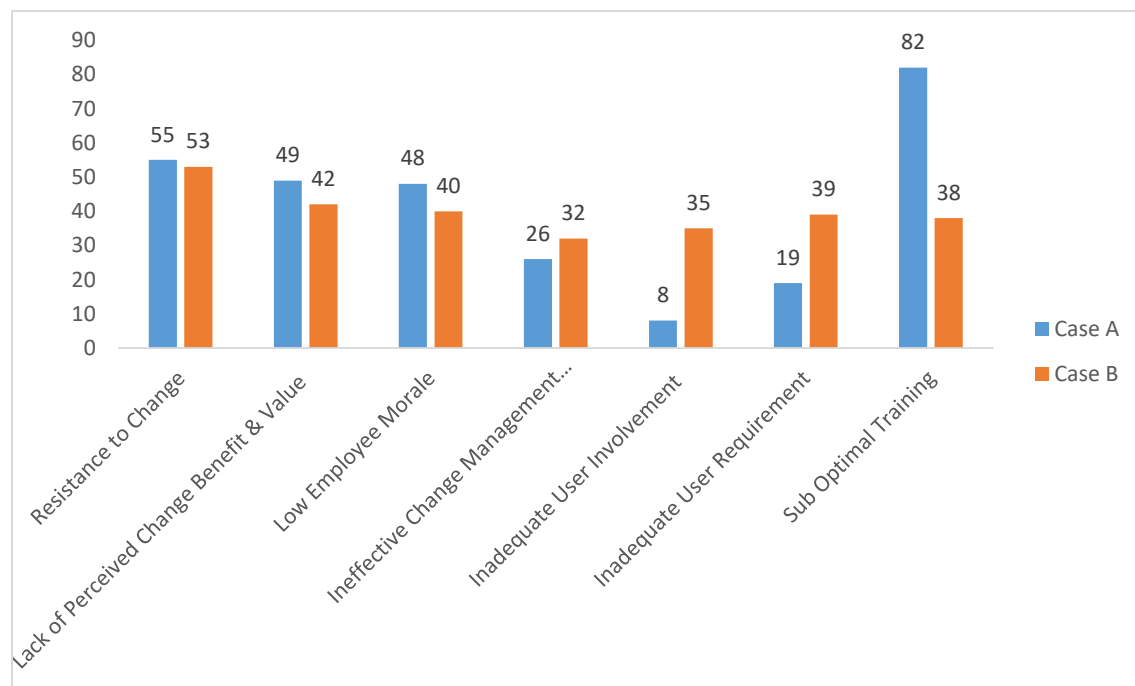


Figure 4-16: Comparative View of Change Management Challenges

With 82 empirical observations from case A and 38 from case B, sub-optimal training emerged as the most significant challenge across both cases. Significantly more occurrences of sub-optimal training were unveiled in case A. Resistance to change emerged as the second most prevalent challenge with approximately the same number of observations from both cases. Forty-nine empirical observations relating to lack of perceived change benefit and value were unveiled in case A, as compared to 42 observations made in case B. Resistance to change was the third most prevalent challenge with approximately the same number of occurrences throughout the two cases. Forty-eight empirical observations of low employee morale were noted in case A and 40 observations were made from case B respectively. Both ineffective change management initiatives and inadequate user requirement were more noticeable in case B with 32 and 39 occurrences respectively as opposed to 26 and 19 from case A. A lack of user involvement was also more prominent in case B with 35 empirical observations against eight from case A.

#### 4.4.1 Resistance to Change

Resistance to change is further divided into user resistance to change, partial usage of the new solutions and a resistant organisational culture. As depicted in Figure 4-17, resistance to change emerged as a prominent theme amongst all the different user groups.

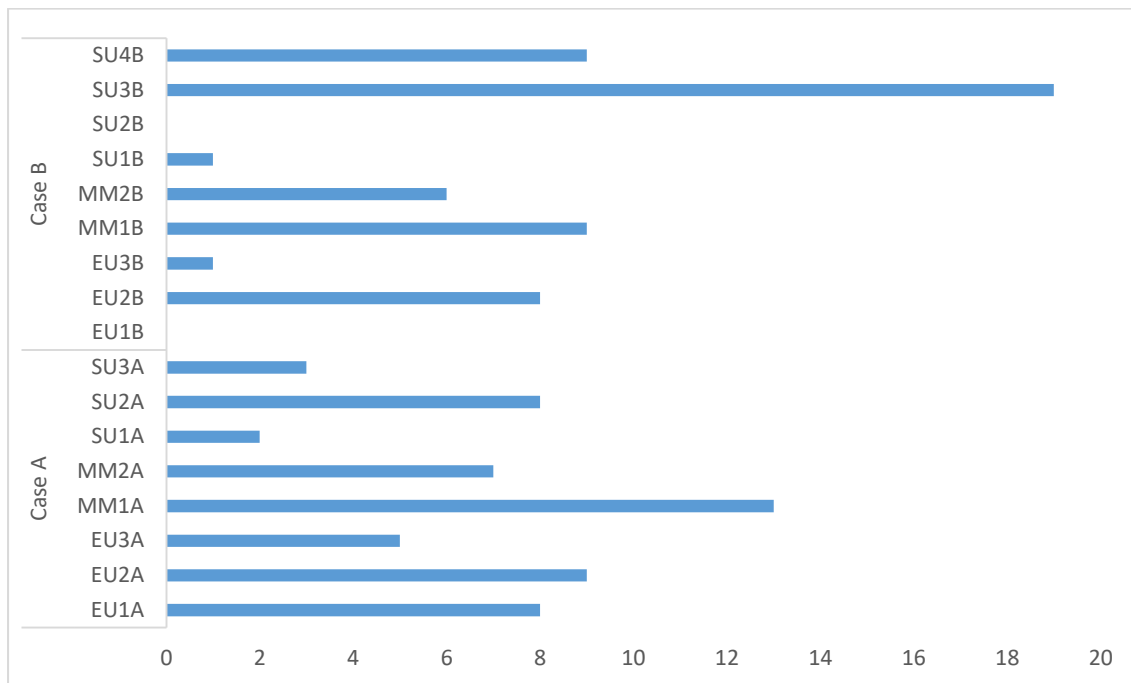


Figure 4-17: Resistance to Change

##### User Resistance to Change

User resistance to change is defined by instances where employees conferred their reluctance to accept the SAP solution or any change-related activities. Employees from case A categorically stated that they did not want to use the solution and were reluctant to participate in any change-related initiatives. The quotes below depict the resistance of managerial level employees and end-users.

*"But I, from [Forecasting], I have been reluctant to use SAP PPM ... it was my decision not to go on training as I knew I was not going to start using the system" MM1A.*

*"I did not go to any of the roadshows conducted this year. It was compulsory but I chose not to go ..." EU2A.*

*"... We should not have used SAP at all, scrap it" EU1A.*

Employees felt that the change was forced upon them; there were too many frequent changes with regard to new technological solutions and they were tired of coping with the constant change. Consequently, they were unwilling to accept any new system.

*"... I've probably used about 100 different systems here. I am not even exaggerating here. Everyone is tired of new systems. Every time a new one*

*comes out there, they just change, not even giving the previous one a chance ...” MM1A.*

The situation was similar in case B where managerial level staff and support-users as well as end-users showed resistant behaviour.

*“We are still resisting use of the modules” MM2B.*

*“With SAP PPM, as much as we have been trained and retrained over and over, there is still resistance” EU2B.*

Moreover, the support-users stated that engineers were perceived as the most resistant employees as they showed strong reluctance to the new enterprise solutions.

*“With engineers, it is the same everywhere ... they have been the most resistant people” SU3B.*

### Partial Usage of the Solution

Partial usage of the solution refers to the limited use of the enterprise solution. Employees from both cases stated that they were aware that the enterprise solution was not accepted and was not being used in the way it was intended to be. Although the norm dictated that all the different operating units across the regions should have been using the enterprise solution, employees did not conform to the standard practices and were only using the solution to a limited extent. Out of the six provinces, only three of them acted in accordance. The quote below provides a contrasting view of the expectation of use and the actual usage of the system by the different regions.

*“So the understanding is that SAP PPM has been deployed and is being used. Having said that we do know that there are some regions that do not follow the recommended processes” SU3A.*

*“Of the six provinces, there is probably only three which are using. I heard them talk about it” MM1A.*

Employees from case B further stated that there was only one employee from their operating unit who was using the enterprise module on a daily basis, with the situation not being any different from other operating units.

*“Currently, there is one person in this region using the system on a day-to-day basis, only one person in this whole OU [operating unit]. She will tell you, she looks at the reports of other OUs and nationals and she will tell you she can see little or no movement from other OUs as well” SU1B.*

### Resistant Organisational Culture

Employees also discussed the cultural differences between the various regions contributing to the resistant behaviour. Employees explained that the diverse organisational culture prevailing in the organisation resulted in some employees exhibiting stronger resistant behaviour as opposed to others.

*“You know it is about the culture of the company, you know what type of people you are dealing with and how different the environments behave to different things ... you can understand that some people are anti-systems” MM1B.*

While some regional units were perceived as culturally compliant and were more cooperative by conforming to instructions, others were more resistant and were more likely to question the change while inhibiting the transition.

*“... different regions add different insights and values ... but whenever there is an issue, executive management will say well the other regions are not complaining, why are the other regions not complaining, why is western region complaining” SU2A.*

In particular, the western business units exhibited a more resistant culture whereas the eastern regions were seen as being more compliant; eastern regions were willing to at least try and test a particular solution before opposing its use. The diverse cultural behaviour led to a distressing situation where change takes longer to be accomplished.

*“But you see in our region, we really do try and comply with the national requirements. ... And as I was saying it is really the culture. You have got a culture that says we will comply or at least try it out as opposed to a culture that says no this is new, we do not know what it is, we like the way we used to do things. Then the switching from one software to the other or using a new software will take longer, it will be more painful as people are more resistant” MM2A.*

#### 4.4.2 Lack of perceived Change Benefit and Value

Lack of perceived change benefit and value recorded all instances where employees discussed a lack of added value or a lack of direct benefit associated with the use of the new solutions. A lack of need for the change and disharmonies of interest also formed part of this category. Interestingly, all the different categories of users identified the lack of change benefits associated with the use of ERP solutions as a major challenge. This is depicted in Figure 4-18.



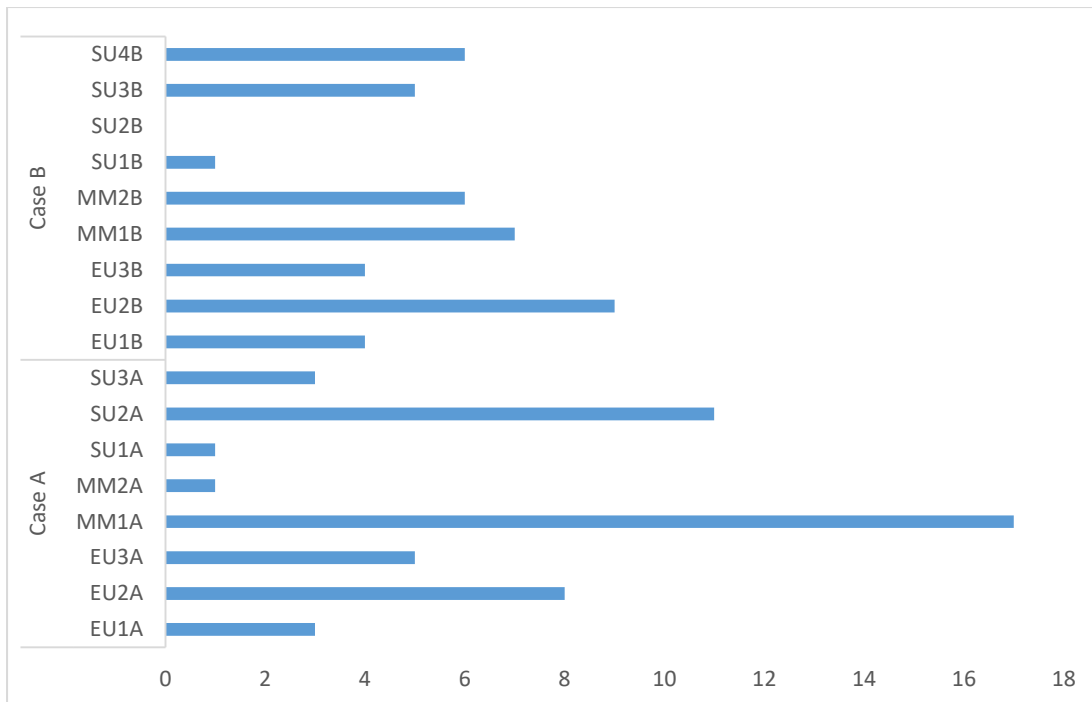


Figure 4-18: Lack of Perceived Change Benefit and Value

Despite noting more instances of this challenge in case A, employees from both cases stated that the implemented solutions should be value adding, allowing them to work more efficiently to manage their existing workload. In this context, the SAP solutions did not provide the employees with any additional benefits in order for them to be competent and productive. On the contrary, the solution was perceived to be redundant, added to their workload and did not cater for the required functionality, as a result of which users attributed absolutely no value to the system.

*“But the major thing we have been asking for is the reporting, to have proper reports. It does not help to input the data in one system and the users cannot extract the data. There is no benefit for them to use the system” SU1A.*

Moreover, both support-users and end-users believed there were easier and more efficient ways of completing their assigned tasks; they could achieve the same results quicker and more effortlessly through their preceding systems.

*“The methods that they have implemented are cumbersome and not practical, so you cannot achieve your output quickly and easily” SU2A.*

End-users stated that they were already overworked. Unless they perceived a direct benefit associated with a new system, they were unwilling to comply with methods which are time-consuming and add considerably to their workload.

*“We already do not have time to complete everything that is assigned to us and now, they are just loading extra work to us without a benefit that we can see ... I don’t mind change if it is for the better. I have a big issue when it’s just another thing that needs to be done” EU3A.*

*"The program is not adding any value to me, why must I spend more time doing that" EU2A.*

Likewise, managerial employees from both cases did not see the benefit of the change and were concerned with the additional amount of time and effort required to use the new systems as compared to their existing ones.

*"As far as I am concerned, I have not seen anything better than before"*  
MM1A.

*"In other words, the system is supposed to make it easy for you to complete your work but it takes you more than ten times as much time for you to complete one project as you would have in your traditional system"*  
MM1B.

### Lack of Need for Change

Most employees did not understand the strategic need of the enterprise solution. They displayed their fear of change by constantly questioning the implementation of the new solution as they did not see any value in this new solution. Numerous comparisons to their previous systems were drawn where they felt their preceding systems catered for all their existing requirements and they had never felt the need for a new system. Rather, the new system was regarded as a misfit as it did not cater for their needs.

Employees explained that they had been working with their prior system for a number of years and found that it operated in the most logical way, the same way as how they would think and function. They did not feel that the new solution provided any added value or any new functionality that would enhance their productivity.

*"I have gotten used to the previous program, it seems like the most logical steps to use. I feel like all the information we can potentially have/use is on the previous program. ... Nothing that I feel I can say hey I can do this now and I couldn't do" EU1A.*

### Disharmonies of Interest

Additionally, disharmonies of interest between employees and executive management have been highlighted. Employees felt that, particularly with the newly implemented ERP solutions, there were no direct benefits resulting from their use. End-users did not see the tangible advantages associated with use, as any benefit would mostly be recognised at strategic level. The SAP solutions were solely beneficial to executive management who aimed for better visibility of existing and future projects. However, this strategic objective could only be achieved by ensuring that end-users captured their respective allocated projects on the enterprise systems from the project initiation phase. End-users, on their side, did not see any benefit of this exercise. On the contrary, they saw this exercise as a redundant one.

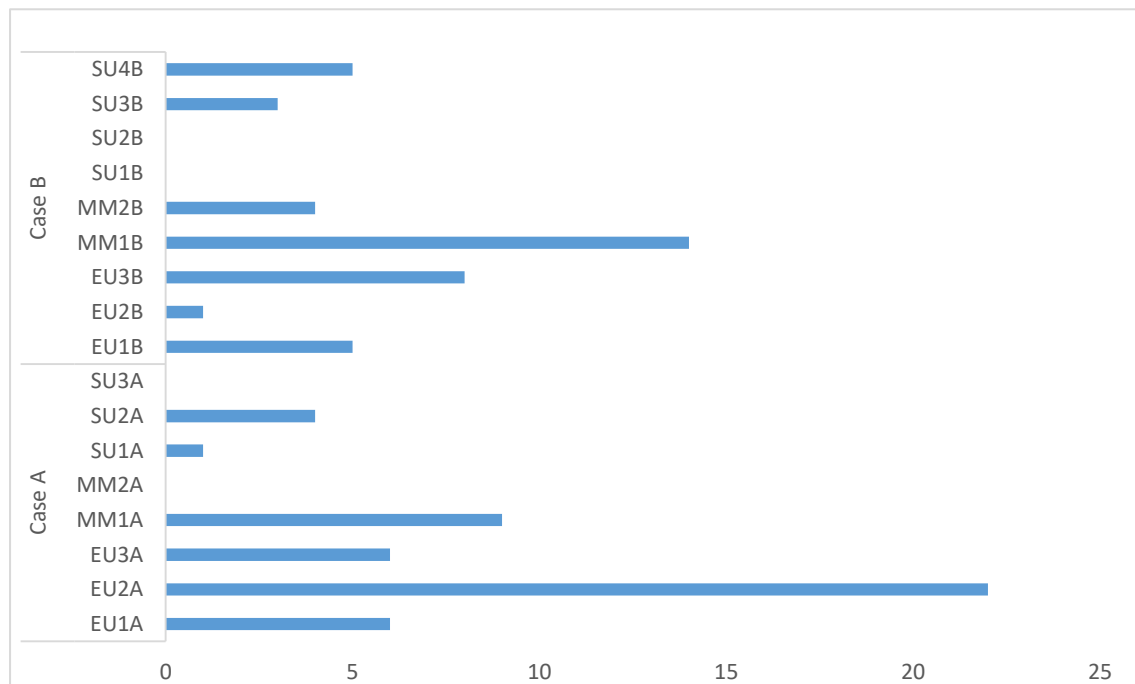
*"... The issue there is that enterprise systems require users to input data in the system but the value or the benefit of the system is realised somewhere else. In fact, such a project is SAP PPM. The users who capture*

*those projects will not necessarily see the benefit of doing that but senior management will have the benefits of being able to prioritise projects. In fact, there is a disconnect because [the organisation] does not look at the incentives of the users to start using SAP correctly, that's the challenge we have with this large enterprise systems" SU3A.*

*"PPM is, at the end, about reporting, so that the head office can get one overall picture but I don't see any benefit to me. ... I have not seen anything better than before ... so the benefits to me were minimal. In fact, I think things are slower now" MM1A.*

#### 4.4.3 Low Employee Morale

Employees used different terminologies to express their negativity against the system. Low employee morale recorded all instances where employees displayed negative behaviour, showed frustration, dejection and negativity towards the change. Low employee morale was noted in both cases, more observations emerged from case A as opposed to case B, as



depicted in Figure 4-19.

Figure 4-19: Low Employee Morale

Throughout the implementation cycle, starting from the training sessions to the implementation and to the current post-implementation phase, numerous occurrences of low employee morale were recorded. While some felt they had been abused, others showed dejection and felt they were treated as laboratory rats, as portrayed by this quote.

*"I am not sure if we were guinea pigs ... because there were a lot of faults in the system ..." EU1A.*

Employees conveyed their disapproval towards the change and gave numerous examples of how it adversely affected the employee morale throughout the organisation, regardless of the role and designation of the employee. The fact that both managers and end-users were against the system, only served to further deepen the emotional distress.

*“If you have the boss being emotional of the system, you are almost tearing your people up to become even more emotional. ... The people were very negative with the new SAP system ... our project controllers, project services officers are down; these are the major users of PPM and cProjects and they are completely down” MM1B.*

Managerial level staff reacted excessively in national meetings to express their displeasure with the new solution. The SAP solution made them irritated to the extent of being aggressive in meetings and frustrated to the point of reassessing and reflecting on their current job positions. They displayed aggressive resistant behaviour which fuelled the resistant reaction of end-users.

*“Everyone not only within this operating unit but throughout the organisation, everyone was on the verge of quitting their job, when you attend the national meetings everyone even managers are against the system. For instance some of them sometimes they speak so hard about the system, they even become violent in meetings. They become very emotional” MM1B.*

*“And there's a lot of negativity about anything SAP-related because of the implementation disaster” MM1A.*

End-users throughout the organisation were despondent about the change to the extent of wanting to resign from their jobs. The change posed a greater threat to the main users of SAP PPM and cProjects, whose morale had hit rock bottom.

*“I am an engineering type of person, if you turn me into a clock, I don't even want to do the job anymore. I want to move somewhere else if I can't do the work” EU2A.*

#### 4.4.4 Ineffective Change Management Initiatives

Ineffective change management initiatives are defined by the absence of a clear change policy, inadequate support structures and ineffective communication. Employees, at all levels, discussed the lack of change initiatives put in place by the organisation, as depicted in Figure 4-20.

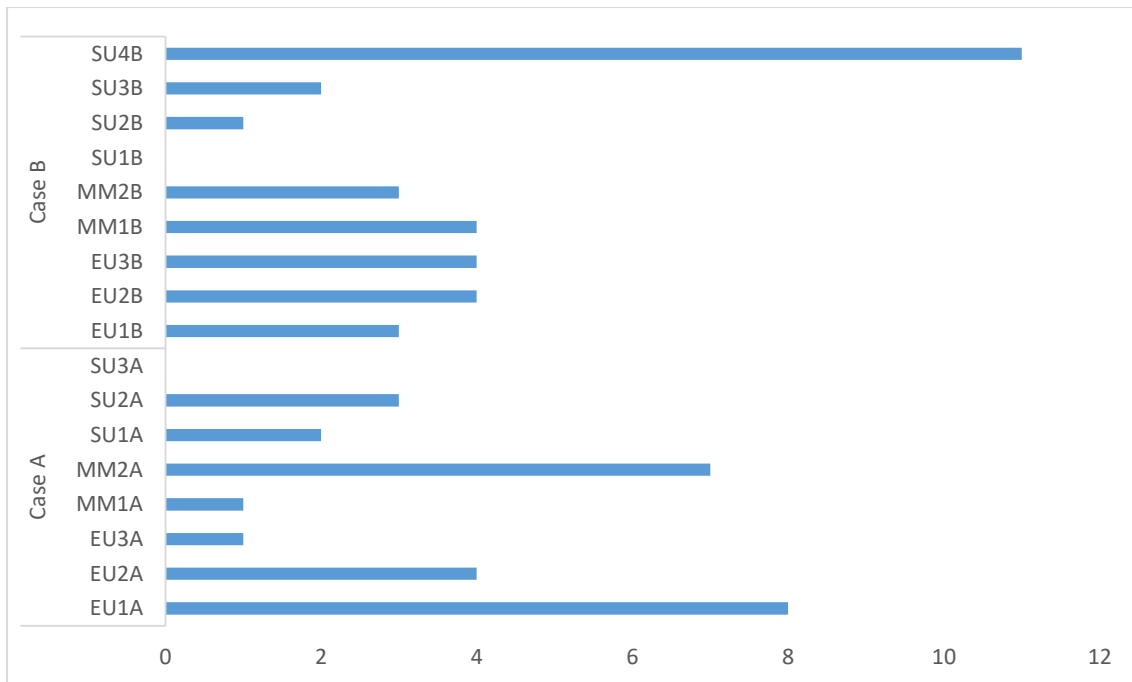


Figure 4-20: Ineffective Change Management Initiatives

The organisation did not implement any change measures and employees were merely informed of the implementation.

*“There were no change initiatives. We were just told that there will be an implementation ... there were no change initiatives, even now there is nothing” EU2B.*

#### Absence of a clear change policy

Some respondents categorically stated that a change management plan to deal with an implementation of this nature was clearly lacking in this implementation. They further mentioned that while the organisation constantly went through numerous changes, a clear change policy of which they were aware had never been in place.

*“[The organisation] does not have a change management policy and this is still lacking in the organisation. We never had a policy ... we have a case where there is no change management policy” SU4B.*

Employees emphasised that the change happened in an unstructured, disorganised and chaotic way. The following quote provides an interesting insight into the perception of how change is generally dealt with in this particular organisation.

*“If you decide that you are going to repack your house, you start in one room and you slowly reorganise. You do not chuck everything out into the yard and repack it in one go. It’s often what happens with the organisation” SU3B.*

Employees further remarked that it was unfair for them to have to deal with a major change that had not been adequately structured. The organisation needed to be more considerate

in its change approach, and more proactive in managing users' resistance, as opposed to expecting employees to immediately adapt to their new environment.

*"It is unfair to introduce such a huge system and expect users to adapt immediately knowing how resistant people can be especially with regards to systems" SU3B.*

#### Inadequate Support Structures

Moreover, there were not adequate support structures in place to support the enterprise solution and to deal with the numerous prevailing issues. No resources from the national IT unit were assigned to take ownership of and show accountability for the encountered issues during the implementation and post-implementation phases.

*"Your Information management [IM] department must be the one who supports the enterprise solution ... we did not feel there was someone like that. ... It should not be supported by the people who will ultimately be using it, the accountability of someone central from the IM environment was missing" MM1B.*

Employees were required to fix the issues by themselves. Employees had to physically amend the data before they could utilise the SAP solution.

*"They did not want to go back to fix it, or to do a roll-back or to agree that they made a mistake, they rather forced us to fix the data errors manually for months after the implementation. That was a huge change management error that management did perception-wise" MM2B.*

#### Ineffective Communication

Ineffective communication relates to occurrences where a lack of, or unclear and inconsistent information flow on the organisation's strategies, change objectives and on the current and future state of the transition is noted.

Participants advocated that there were not recurrent communication updates sent on the strategic justification for the change, the status of the implementation, future roll-out plans and strategies leading to situations of unawareness.

*"But it is not like we are constantly getting emails. ... I have not seen anything which says now we are at this stage and we are expecting this to happen. We do not get frequent emails or updates to inform us of the status of the project" EU1A.*

*"There is no official communication that I can remember. There are hundreds of emails coming to me every day but nothing that I can remember on SAP" EU2A.*

At the time of the interviews, respondents from case A had not started using SAP PPM; they were unaware of when they would have to start using the enterprise solution. The initial training was conducted in October 2011 and, a year later, employees claimed that they had

not heard anything regarding the status of the system. Although employees assumed that they would be required to eventually use the enterprise solution, they were ignorant of any clear milestones. End-users from case A did not have much clarity on the status of the project, as quoted by these two interviewees.

*"We will use the system eventually but no one knows when .... But I do think there will be a point where they will tell us from this date this is how we will capture projects and then we will start using SAP" EU1A.*

*"We were told we were going to implement it in August 2012, now we are in August 2012 and we have heard nothing. I do not know anything about it ..." EU2A.*

While some employees hoped they were nowhere near the transition stage, others hoped that the implementation had been cancelled and they would not be required to use the system.

*"No one knows when it [the transition] will happen for sure. I am hoping it won't be anytime soon ..." EU1A.*

*"They are going to go live at some stage, we have been in a frenzy – hoping that it won't be implemented and we won't have to use it" EU2A.*

On the other hand, employees from case B stated that they were in the post-implementation phase but were still dealing with a number of challenges and were still awaiting new functionalities to be deployed. Employees were unsure of when the outstanding functionalities of the enterprise solution would eventually be delivered. Employees stated that they had never had a direct, clear response regarding the future deployment of a bug-free solution meeting user requirements.

*I cannot guess anymore when it is going to be ready. I believed them when they said next month, next month, next month because they used to tell us next month next month ... it is always next month" MM1B.*

Moreover, employees criticised top management for withholding key information and for not supporting an open, clear communication channel. There was a massive communication gap between top management and the different operating units. Not only were employees not informed of top managements' initiatives, the latter also displayed an unresponsive attitude towards the numerous concerns of the employees while leaving the former to suffer in silence.

*"For any big change, communication is key. If they communicate what is going to happen and as soon as something goes wrong, communicate immediately and do not wait and do not let us suffer in silence and only afterwards act" EU3B.*

*"If there were any problems implementing it to the bottom, it seems to me it never got to the top again" EU2B.*

#### 4.4.5 Inadequate User Involvement

Inadequate user involvement refers to a lack of user involvement as well as the involvement of an incorrect representation of user base. As illustrated in Figure 4-21, all three categories of participants across both cases recognised this challenge. However, these related issues were, comparatively, more prominent amongst participants in case B.

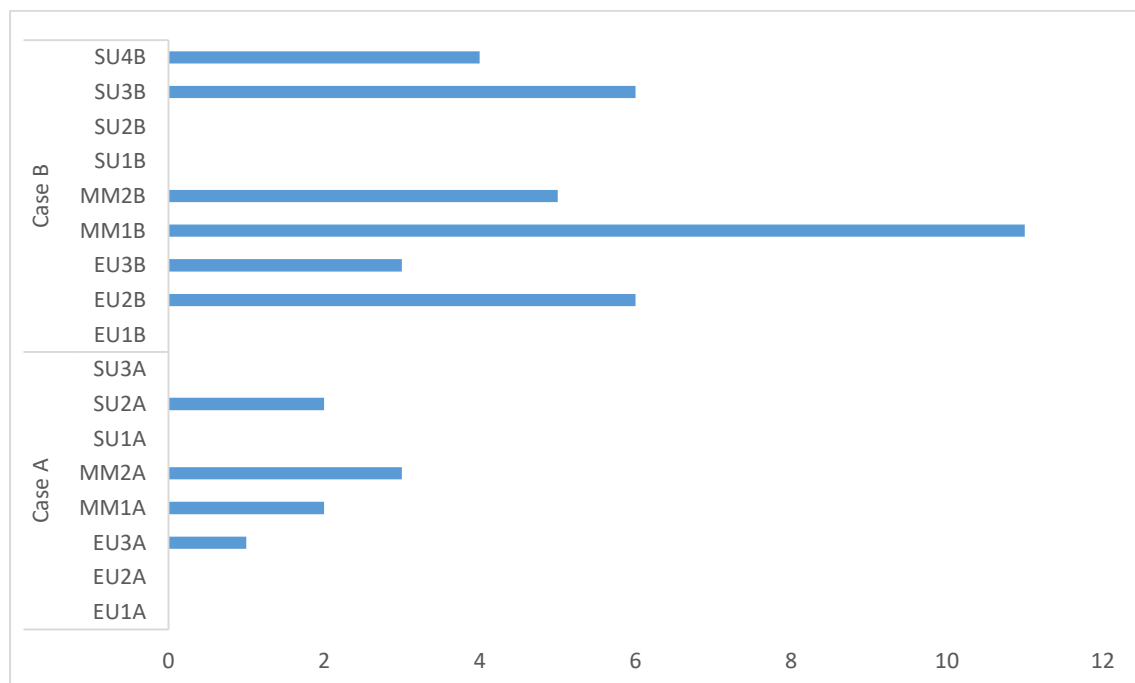


Figure 4-21: Inadequate User Involvement

One of the major problems of the implementation was the lack of involvement of end-users who would be using the enterprise solution on a regular basis. Employees underlined the minimal interaction of external stakeholders and executive management with the end-users of the system during the ERP implementation lifecycle.

*"The biggest problem with this whole change was the actual people using SAP on a daily basis were not consulted" EU2B.*

*"Those people were not involved at all. Only towards the final stages of the projects when it was ready to be implemented and when data was migrated, then end-users were involved which for me was too late. Main user involvement came too late" SU3B.*

Not only was end-users' involvement limited, the right employees were also not involved, as depicted by this quote.

*"I would say the correct users were not involved, you would get a few people but not those who work on the system" EU3B.*

Further probing reveals that, initially, the organisation recruited a few managerial employees to be part of the initial implementation phases. The organisation's decision to involve managerial staff as opposed to end-users was criticised by employees.



*“You can’t take a manager who does not even know which button to click to do whatsoever, it does not make sense to me. That person is not going to be using the system, the person who will be using the system is sitting down there” SU3B.*

#### 4.4.6 Inadequate User Requirement

Inadequate user requirement records all instances where employees discussed the inaccurate and incomplete requirements resulting in an enterprise solution which did not conform to their desired requirements. The term inadequate user requirement inherently represents inadequate specification of user requirements. Inadequate user requirement will be used throughout this research for parsimonious purposes. Inadequate user requirement was discussed by all three categories of participants from case B, whereas only support-users and middle management from case A referred to this challenge.

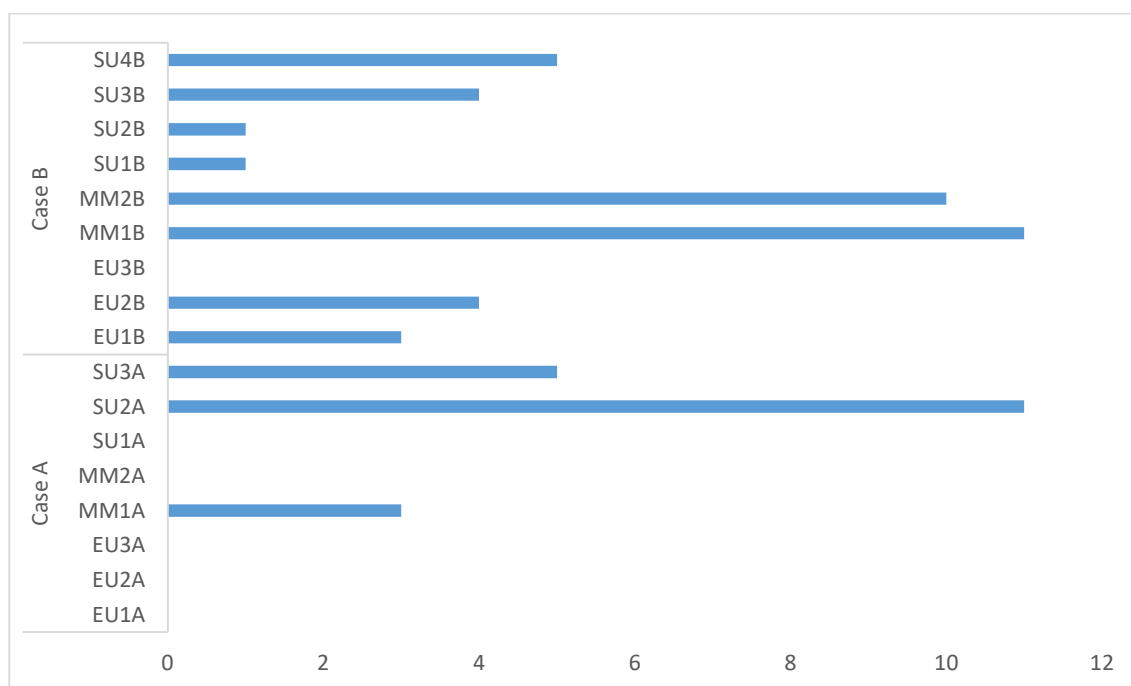


Figure 4-22: Inadequate User Requirement

Employees argued that none of their desired requirements were fulfilled by the new ERP modules.

*“I would say the two new modules, SAP PPM and cProjects, all the requirements that we wanted from the system, the system at the moment cannot cater for those requirements” MM1B.*

Employees further asserted that solutions implemented in the organisation seldom catered for their requirements. Desired user requirement was generally downsized due to a number of reasons, resulting in incomplete user requirements.

*“Generally, the actual software getting delivered does not cater for a lot of the requirements that are asked for by users. ... Functionality gets scaled down, cut back, what you ask for is not delivered for in the end” SU2A.*

Other explanations accounting for the inadequate user requirement referred to the lack of documented requirements and specifications. In effect, user requirements were barely sourced and documented.

*“... User requirements upfront were not completely documented in terms of what the users were expecting from the system” MM1B.*

Since the objective of the ERP solution was to cater for the needs of the whole organisation, putting together consolidated user requirements required consensus from a larger number of stakeholders. This proved to be a problematic endeavour. The difficulty in sourcing key representatives to seek shared requirements is highlighted here.

*“... if you look at something like SAP PPM, because it is an organisation wide one, you generally have a lot more stakeholders and a lot more difficulty getting agreements to get the user requirement inked down. We don't necessarily have the representation from every single region come together to work on something like this. That was probably the biggest difficulty in getting the PPM requirements down ...” SU3A.*

Consequently, employees did not perceive the ERP solutions as suitable solutions to cater for the general requirements of the business. In effect, they described the solution as a poor fit for their needs.

*“Also, cProjects is not as good as MS Projects. ... I do not think the cProjects meets the business requirements” SU2B.*

#### 4.4.7 Sub-optimal Training

Sub-optimal training is further divided into unstructured and uncustomised training, lack of usefulness of training content, limitations of the training solution and sub-optimal training infrastructure.

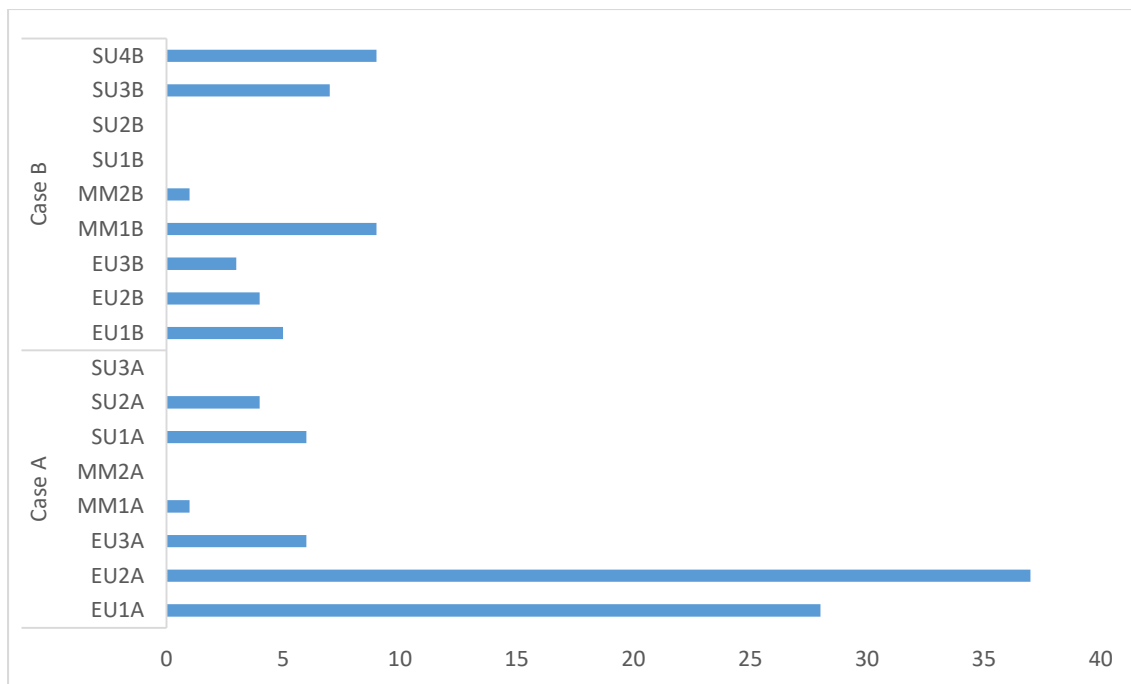


Figure 4-23: Sub-optimal Training

The comparative analysis within the two different operating units demonstrates that considerably more training challenges were discussed by the end-users from case A, as illustrated in Figure 4-23. The fact that EU1A and EU2A were interviewed within months of the initial organisation-wide training might be a plausible explanation accounting for the higher number of occurrences. On the other hand, participants from Case B were interviewed, a year later, when possibly a number of mitigating strategies had already been put in place to manage the identified challenges. A breakdown of training challenges is now provided.

#### Unstructured and Uncustomised Training

In this context, unstructured training has been defined as a lack of training format in terms of training structure and guidelines, as pointed out by the employees. This observation was predominantly debated by the end-users who stated that the training did not have any specific format or structure. There were no clear guidelines to follow, they felt they were only filling random blocks and could not figure out what information to enter in the different cells.

*“The training had no format and no structure...There was no format, no info on what to fill where. Filling little lines all over the page, 1-20 on the 1st page makes no sense to me. Fill one, miss five, fill another one, no format, makes no sense to me. This can't be productive” EU2A.*

The training was seen as a click and paste exercise with repetitive data that needed to be entered in the system. The following quotes illustrate this.

*“So the training showed us how to click on SAP. This is what we did; ‘Click, Click, Click, Copy Paste, Copy Paste’ .... It was ridiculous, it was insane to*

*have more than 300 steps of clicking ... we had to copy what they were doing. Enter these values, click next, then do that. Click that button” EU1A.*

*“But it was just click here and click here and it would give you the screen prints/dumps of everything. But it is not the same situation when you go back to the office” EU3B.*

The initial organisational-wide training sessions included employees from different operating units such as finance, implementation and forecasting units. Each operating unit was responsible for different business processes and sub-processes. As a result, the training focused on a holistic process, on various functions relating to different processes, as opposed to concentrating on individual processes which a specific set of users from one operating unit could relate to. Employees stated that they were overwhelmed with the amount of information they were exposed to during the training. They perceived the training as being too long and felt there was a lot of information which was not specific to anyone’s job role.

*“So there was too much of information given which was not specific to anyone and you did not know what to focus on and where this data is supposed to come from” EU1A.*

The in-house trainings covered the whole organisational-wide processes. Employees, however, stated that they had to apply selective focus to filter only the essential information and disregard sections which were perceived as redundant.

*“... in training like these, you take in what is applicable to you, you see everything but you do not take it in, because you are never going to use it because it is not part of your role and you do not have access to it” EU3A.*

Others, however, were lost amidst the information overload; they subsequently lost focus on the information being shared and could not shift their mind back to follow the course.

*“The training was a two-day course. For a day and a half, I did not even know what they were doing. I was switched off, waiting for them to finish” EU2A.*

*“The way the training was done, it was boring, after ten minutes you were not really listening” EU1A.*

Employees were confused with regard to their role definition and ownership of the different processes. They did not understand the purpose of the different processes and functions. The trainers were unable to clear this confusion, resulting in a certain level of frustration amongst the employees; subsequently, they lost interest in the training and saw it as unproductive, as depicted by the following quotes.

*“If you are planners, this is all you need to do. I do not feel we had to do all these steps and a lot of the information needs to be entered before we would see it as planners, someone else would have already entered that*

*data but when we doing the training everyone was confused with what and why we need to do certain tasks” EU1A.*

*“I am not sure of my responsibility, which part of the system/process falls under my responsibility in SAP, the data that am I supposed to fill or which part the next guy in the line/other department fills in” EU2A.*

Employees believed that the training would have been more effective and easier to follow had the training been of shorter duration and had the information conveyed been limited to their specific and individual department, with customised processes.

*“If the trainers said, this is only two pages of information you need to do, we would be calmer. So there was too much information given which was not specific to anyone and you did not know what to focus on and where this data is supposed to come from” EU1A.*

*“... Instead of a two-day course, maybe they could have shown me my process in two hours; this is the part of the system you need to know how to use and these are the information we want” EU2A.*

Furthermore, not all the participants had the same level of technical competency. While some employees had prior exposure to enterprise solutions and could relate to the system slightly better, others did not have any prior SAP exposure. Combining different users with different levels of competence in the same training session had a number of adverse effects on the users. Since it took longer for first-time users to understand the process and solution, the pace of the training was considerably slowed down. Consequently, the training did not cover all the required functionalities as part of the training agenda.

*“... They did the training with all of us including the project coordinators. Project coordinators do not use SAP as much as we use them. So they did a combined training and they would not cover everything until you get to work with the system” EU1B.*

### **Lack of Usefulness of Training Content**

Lack of usefulness of training content refers to instances where employees attributed no value to the training conducted, as well as the training documentation such as training manuals, scenarios, power point slides and assessment pools provided during the training workshops. Employees felt that the training sessions did not provide them with any added benefit. They regarded the training as a forced, disjointed, boring and frustrating experience. It was perceived as ineffective and a waste of productive time as, at the end of the session, they had not learnt much.

*“The training did not help much to actually use the tool. You need to sit and figure it out yourself” EU3A.*

*“And the training manual was very poor” SU1B.*

Not only did the employees describe the training documentation as poorly conceived and outdated, they also referred to the lack of contextualisation of the training scenarios and exercises, with a poor focus on local context. For instance, employees from the Western Cape Province could not relate to the training examples used as they were mapped and based on a process flow from a different province. The processes were not generic throughout the organisation. Each province had its own way of operating and used its own unique terms and terminologies, resulting in perceived difficulty for the employees to relate to the materials provided.

*“... The examples they used were from Jo’burg, I could not relate to the examples. They work in a different way to us. It would have been nice to have our terminologies with examples customised to how we work” EU1A.*

*“The training material was not even talking to the system that was deployed. This is how bad it was” SU4B.*

At the end of the training session, participants were given an assessment to test their acquired competencies. They perceived the assessments as a mere formality as they did not see the usefulness of the assessments to reinforce their skills. They claimed that anyone could have completed the tests by replicating the information from the training documentation without having a core understanding of the process and hence it was not beneficial.

*“They showed us how to get the answers for the test so they could authorise it otherwise no one would have passed and no one would have been allowed to use the system” EU2A.*

*“Then they give you a power-point presentation and a test. The test was to click here and there. All the employees had two screens, one with the power point and the other the test. The test was us having to click these things. So we looked at power point and clicked wherever it showed us to click on SAP ... I am gaining nothing when am just copying what the presentation is doing and clicking” EU1A.*

### Limitations of the Training Solution

Employees stated that the initial training solutions used for the different enterprise modules were of sub-standard quality. The initial SAP PPM and cProjects training were conducted through simulation exercises which mapped a generic process. Both employees and in-house trainers regarded the simulation training as a real challenge, as they could not manipulate the data to get an actual feel of the ‘To-Be’ solution. Consequently, they did not get an adequate insight and the desired exposure of the new solution.

*“The simulation did not work for me, I like working on a live system. With simulation, if you make a mistake, it tells you there is a mistake, does not tell you how to fix it” SU1A.*

However, when a live server was used, numerous errors and technical faults in the solution were uncovered during this period. The software did not function as intended and users saw the training system as sub-standard.

*“People asked questions, the software was not working correctly ... the system was not up to standard, it was all disjointed. I am not sure whether it is with this computer program or if there was something wrong with their brains. ... It was a half built program” EU2A.*

In-house trainers downright blamed the non-use of the system as a result of the numerous training issues.

*“Everything was not sorted out well in the training, that is why they were wary of the system and why they are not using it yet” SU1A.*

Users also struggled with the numerous variations between the training solution and the eventual solution which was rolled out. The training solution used was not only prone to a number of erroneous outputs, but also differed significantly from the actual implemented solution.

*“There were too many differences, you get trained on this system but the system comes with something different” MM1B.*

Once the enterprise solution was rolled out, employees found numerous contradictions between the new solution and what they were expecting based on their prior training. They could not relate to the new structure and functionalities of the new modules.

*The training to be quite honest with you was not very practical for me. I believe they did not give us exactly what should be happening on SAP, like on job training if I am allocating this, I should expect that” EU1B.*

*“The users were first trained and the system was rolled out ... but, on first usage of the system, you realise that the system is actually different to what we were trained in” MM1B.*

It took longer than anticipated for the end-users to be accustomed to the newly implemented solution. Significant time and effort were allocated and spent on evaluating the major differences between the training and the actual solutions and on learning how to operate the new module.

*“So the challenge was to understand the two as to why there are differences. So that takes time especially for the users to be able to come to terms with the change, to learn and accept the system ...” MM1B.*

#### **Sub-optimal Training Infrastructure**

Other training challenges experienced related to the sub-optimal training infrastructure. Employees criticised the slow training server and network connectivity which resulted in the slow response of the enterprise solution.

*“The two guys [trainers] were running up and down. This whole system would hang up. It was not good” EU2A.*

In-house trainers explained that different training sessions were conducted in various locations all over the country, resulting in a high network traffic and slow response from the training server. The training servers did not respond as expected, as a result of which the training sessions were abruptly interrupted. The trainers had to call the support department in order to restart the server, leading to unexpected delays.

*“The system just hangs and you would have to call the guys at nationals and you have to wait for an hour before it is back. That was inconveniencing. It was more of a network issue because we were introducing many systems, so there were big hiccups. There were lots of delays in the system as everyone was using it” SU3B.*

*“... we had some issues while training we had to ask the [IT team] to restart the server” SU1A.*

## 4.5 Technical Challenges

Numerous technical limitations pertaining to the implemented enterprise solution were unveiled as depicted in Figure 4-24. A lack of core functionality, limited integration, limited offline accessibility and use of multiple systems were perceived as the most significant challenges. Data errors, lack of customisation, complex and rigid user interface and poor technological infrastructure formed the remaining challenges of this category.

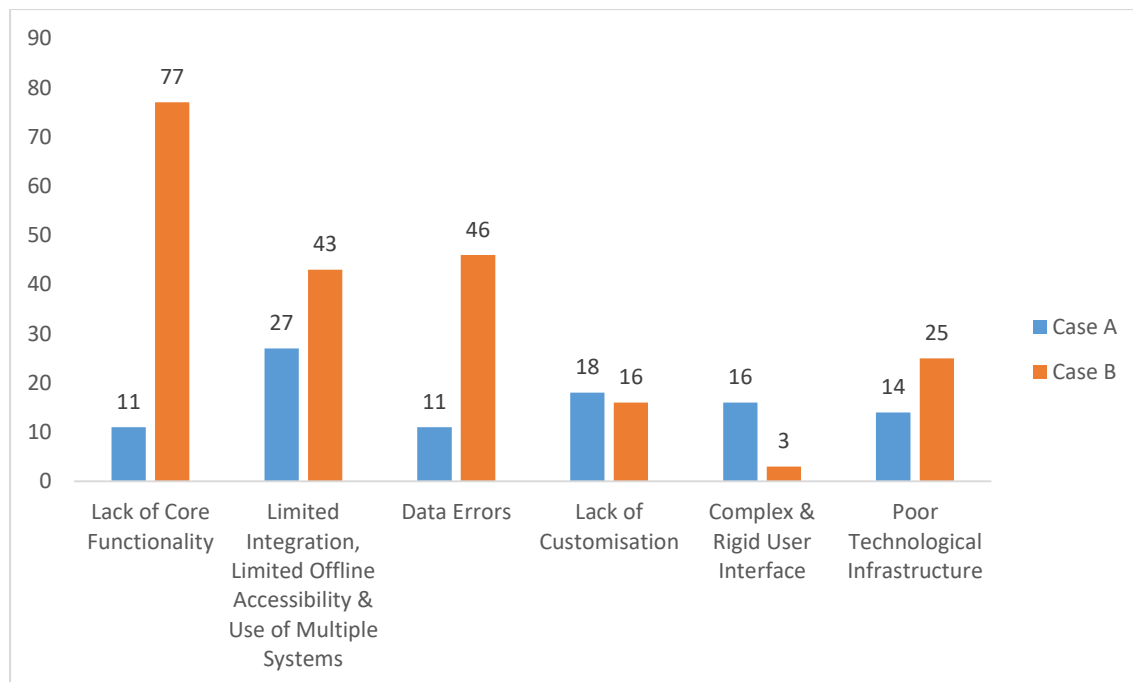


Figure 4-24: Comparative Analysis of Technical Challenges



A lack of core functionality emerged as the most debated challenge, with significantly higher empirical observations made in case B. Seventy-seven empirical observations were noted in case B as compared to 11 in case A. Limited integration, limited offline accessibility of the ERP solution and use of multiple systems prevailed as the second most significant technical challenge, with 43 key observations from case B and 27 from case A. With 46 noted observations from case B and 11 from case A, data errors also emerged as a prominent challenge. Lack of customisation was almost equally debated in both cases with 18 and 16 respective observations from case A and B. With 16 empirical observations from case A and only three from case B, complex and rigid interface was more prevalent in case A. Twenty-five empirical observations relating to poor technological infrastructure were made in case B and 14 in case A.

The comparative analysis demonstrates that, with the exception of complex and rigid user interface and lack of customisation, the remaining technical challenges were more prominent in case B. The fact that participants from case B were engaged with both ERP solutions, as opposed to the single solution for participants from case A, might be a plausible explanation for the higher number of recorded empirical observations. While, employees from case B were already competent and regular users, employees from case A had just completed the initial training and had little interaction with the system at the time of the initial interviews.

#### 4.5.1 Lack of Core Functionality

Lack of core functionality records all the instances where respondents discuss the limited functionalities of the implemented enterprise solution. As depicted in Figure 4-25, lack of core functionality was discussed by all three categories of participants.

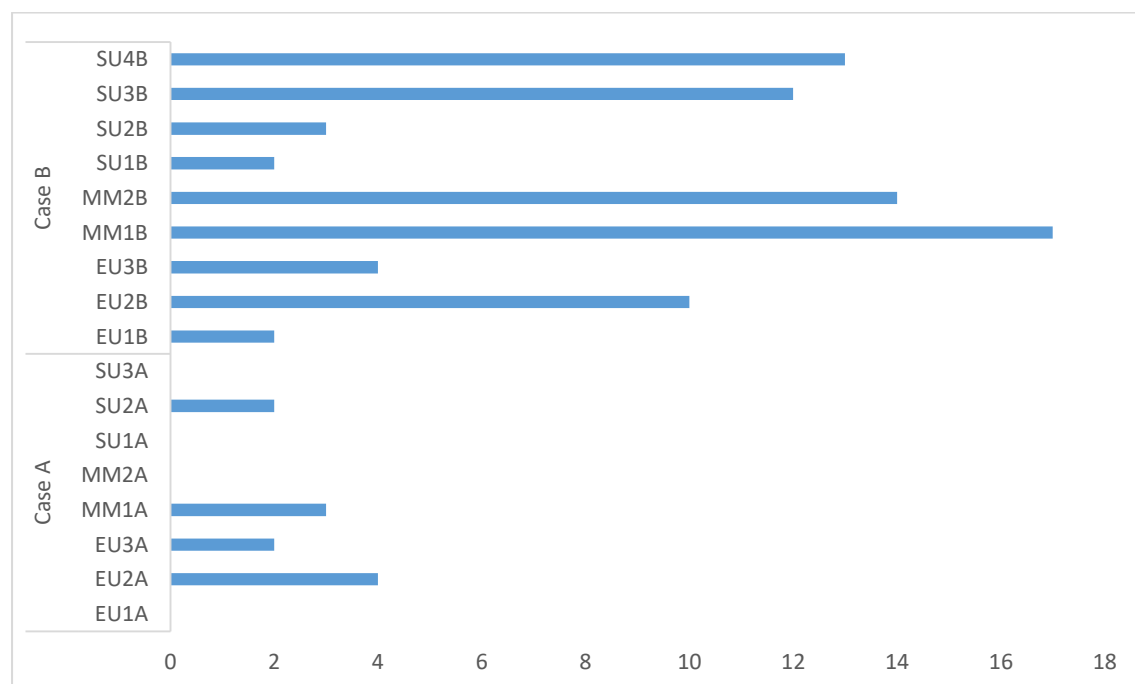


Figure 4-25: Lack of Core Functionality

The solution lacked core and desired functions.

*“[With] SAP PPM and C projects, all the requirements that we wanted from the system, the system at the moment cannot cater for those requirements” MM1B.*

With the implementation of the SAP solution, employees were required to forego their existing customised functionalities. Employees emphasised that their bespoke solution had certain crucial functionalities which the new solution did not cater for.

*“... they gave us the SAP system but they took away some of the core functionalities we had when they put this solution on the table. They took away another system that we had ...” MM2B.*

The new vanilla SAP PPM did not deliver the critical reporting functionalities. Employees concurred that not being able to extract data from the solution had an adverse impact on their assigned tasks and responsibilities.

*“Every new project needs to be entered on SAP PPM for reporting purposes, currently, SAP PPM does not provide any reports. ... The lack of key reporting functionality on SAP had a big impact on the organisation” SU3B.*

*“But the major thing we have been asking for is the reporting, to have proper reports. It does not help to input the data in one system and the users cannot extract the data” MM2B.*

Moreover, the principal functionalities of SAP PPM did not function as required. Employees found numerous errors in the deployed functionality.

*“... the various stage gates in the SAP PPM module is not working the way it is supposed to work or the way we need it to work” EU2B.*

SAP cProjects, on the other hand, was perceived as a limited tool that did not have the required functionalities. Employees were unable to conduct key analysis which could have been easily completed using their earlier tool.

*“For us to populate the schedule on cProjects would just be for monitoring purposes, it won’t have any kind of value for the project manager because we need to do forecasting. ... cProjects is not very flexible and it is very limited with what kind of functions it has. You can just only populate dates, you cannot do any impact analysis if there is a change. And you can do all of that in MS Project” EU2B.*

#### 4.5.2 Limited Integration, Offline Accessibility and Use of Multiple Systems

This theme records all the instances where participants discussed the limited integration capabilities of the ERP solution, the limited offline accessibility of the ERP solution and use of multiple systems. All three categories of employees from case B made reference to this particular challenge as opposed to only middle management and super-users from case A. Figure 4-26 depicts the distributions.

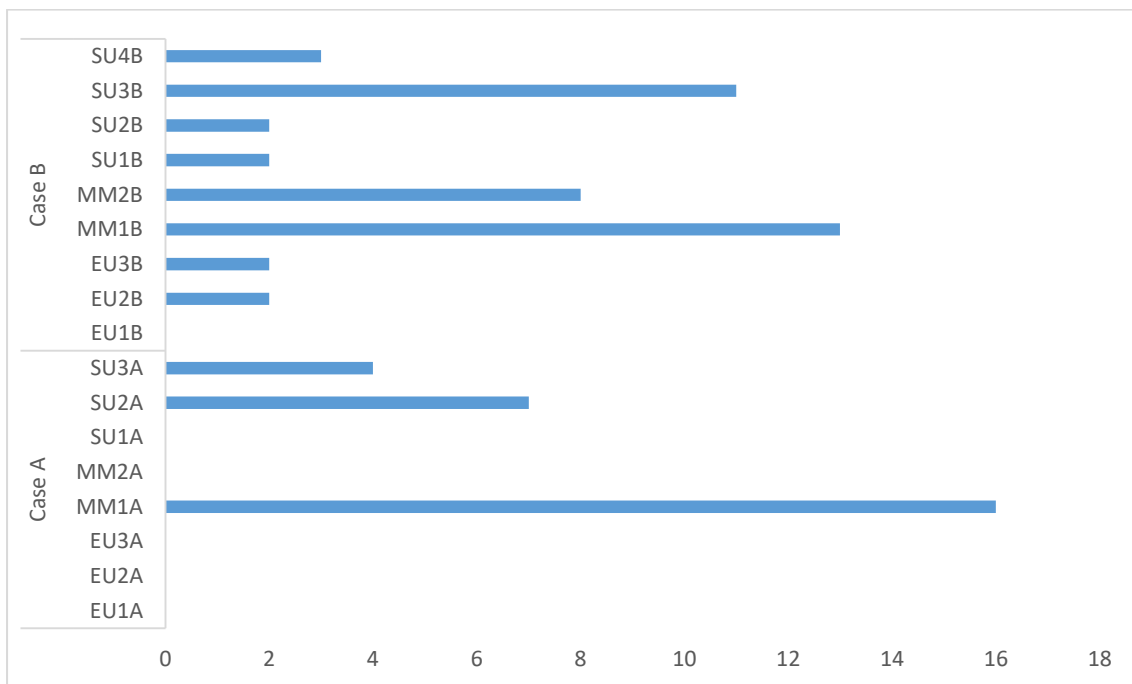


Figure 4-26: Limited Integration, Offline Accessibility and Use of Multiple Systems

### Limited Integration

Employees discussed the lack of integration between their GIS and the ERP solution. One of the core objectives of ERP solution was to integrate the GIS and SAP PPM. However, the integration between the GIS and SAP PPM had not yet been achieved.

*“They are working on an integration so that all the data sits in one database and the different systems draw from there but they have not gotten that right. So I am reluctant to go and, at this time, put things under three different systems” MM1A.*

*“Essentially, where this vision was lost is that [the GIS] was supposed to be integrated with SAP PPM and nothing was integrated to it. ... SAP PPM was supposed to be integrated with other systems as well and this integration was not delivered” SU2A.*

### Limited Offline Accessibility

Employees expressed their disappointment with regard to the general lack of offline accessibility of the enterprise system. With the implementation of cProjects, project engineers were required to rely solely on the module for managing their schedules. The nature of their work entailed that project engineers regularly operated from remote locations and dealt with various external contractors. At any time, they should have been able to retrieve project schedules, update the information and share the schedule with the contractors. They underlined the difficulty of accessing the solution from their offsite locations.

*"The one thing for me is that it is not practical to schedule in the SAP module where you always need to be online. You cannot have a scheduling tool in a SAP module and expect people to always be online for scheduling. ... If you sit at a site, you need to be able to open a schedule on a stand-alone computer and you need to be able to make changes ..."MM2B.*

Employees stressed that they could not be expected to be logged to their organisation's network constantly. They believed that they should have been provided with a tool allowing them to access their schedules from remote locations and they should have been allowed to easily export and import the required information.

*"You must be able to give project managers a tool that they can use on a standalone computer to export and import their scheduling" SU2B.*

*You do not always have access to SAP, so you go to the remote sites and you cannot log into SAP. So you do not want to sit in a meeting where you have your contractors and consultants on site and you cannot get access to your schedule" SU1B.*

### Use of Multiple Systems

The lack of required core capabilities of the ERP solution implied that multiple systems had to be used concurrently. With regard to SAP PPM, project information had to be duplicated in multiple applications in order for employees to be able to carry out all their daily activities.

*"The main problem is the duplication of data, we have multiple systems where the same data is entered ..." MM1A.*

Another objective of implementing the ERP solution was to discontinue the use of legacy systems. However, employees could not rely solely on the use of the ERP solutions to cater for all their needs, hence use of their legacy solutions had to be sustained.

*"Yes, SAP PPM was supposed to replace [the WFMS], but it did not happen" EU2B.*

*"Currently, all the functionality of PPM will not replace what is being done in [the WFMS], that's why we have the difficulty of using two systems" MM1B.*

Employees from both cases expressed their disapproval of this duplication of tasks. Employees from case A categorically opposed the introduction of a new solution merely for data capture purposes. The latter explained that they were already capturing data from various sources as part of their assigned responsibilities. They were already using a WFMS, a GIS and now they were asked to use an ERP solution.

*"My issue is still about the single point of data entry. Because I am not prepared to enter data, the same data into three different places, I did not actually look any further" MM1A.*

However, employees from case B initially complied with instructions mandating usage. With regard to SAP cProjects, external contractors did not have access to the SAP module. Exchanging project schedules between project employees and external contractors became problematic, as employees needed to rely on alternate means to share information with the contractors. They were therefore required to use both cProjects and MS Projects.

*“Our consultants and contractors do not have access to enterprise systems. So how do you give them the schedule? Because you cannot give them a cProjects schedule as a file. ... You do need another medium that you can supply them the schedule with and that would be MS Projects”*  
SU2B.

#### 4.5.3 Data Errors

Data errors record all instances of wrong data alignment and migration and were highlighted by the three categories of employees as depicted by Figure 4-27.

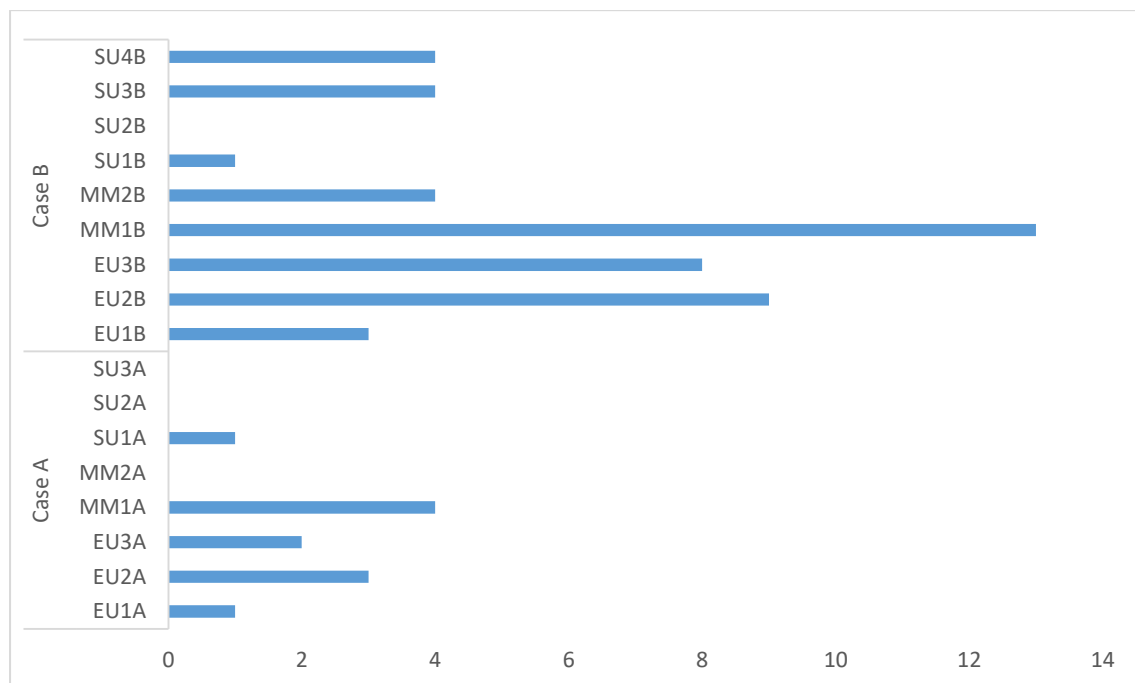


Figure 4-27: Data Errors

Once the enterprise modules had gone live, employees were faced with numerous data errors. Master data was incorrectly aligned, configured and migrated. Users were handed over an unreliable system that produced incorrect and inaccurate results.

*““The master data was incorrectly aligned, it just created a nightmare ...”*  
SU3B.

Project data was incorrectly migrated to cProjects. Wrong naming conventions and incorrect data structures were used during the migration. In effect, the solution which was eventually implemented was totally different from what employees had been expecting, based on the initial communication and agreements. Project information resulting from the wrong data migration had to be altered. Each project had to be manually revised with the correct

information. Employees were required to manually modify and update the data on their new solution to reflect the actual scenarios.

*“When they did the conversion, they converted it to a different format as to what was initially communicated, they converted it incorrectly. That had effect when we had to plan our first budget, for every project that was converted for 700 to 800 projects, we had to manually fix the number and structure underneath it. They put us months backwards with an error in data conversion” MM2B.*

*“... every project had to be aligned or assigned a cProjects schedule. So we had a huge number [of projects] on our side where the data were just out of this world, they were incorrect. We had to make sure that the information is accurate ...” SU3B.*

Employees were required to use both MS Projects and cProjects to share their schedules with external contractors. Exporting and importing project schedules between cProjects and MS Projects, however, led to numerous data errors, since the two solutions were not correctly aligned.

*“We still cannot import and export seamlessly without errors or changes to the schedule” SU1B.*

*“And there is no seamless import and export from MS projects’ to cProjects’ functionality. When you import and export data between MS projects and cProjects, the data is not the same as what you have got on your schedule” MM2B.*

#### 4.5.4 Lack of Customisation

Lack of customisation is another noteworthy concern amongst the participants. In this context, a lack of customisation refers to a lack of software customisation and a lack of adequate configuration of information. This challenge was mentioned mainly by super-users and end-users from both cases, as depicted in Figure 4-28.

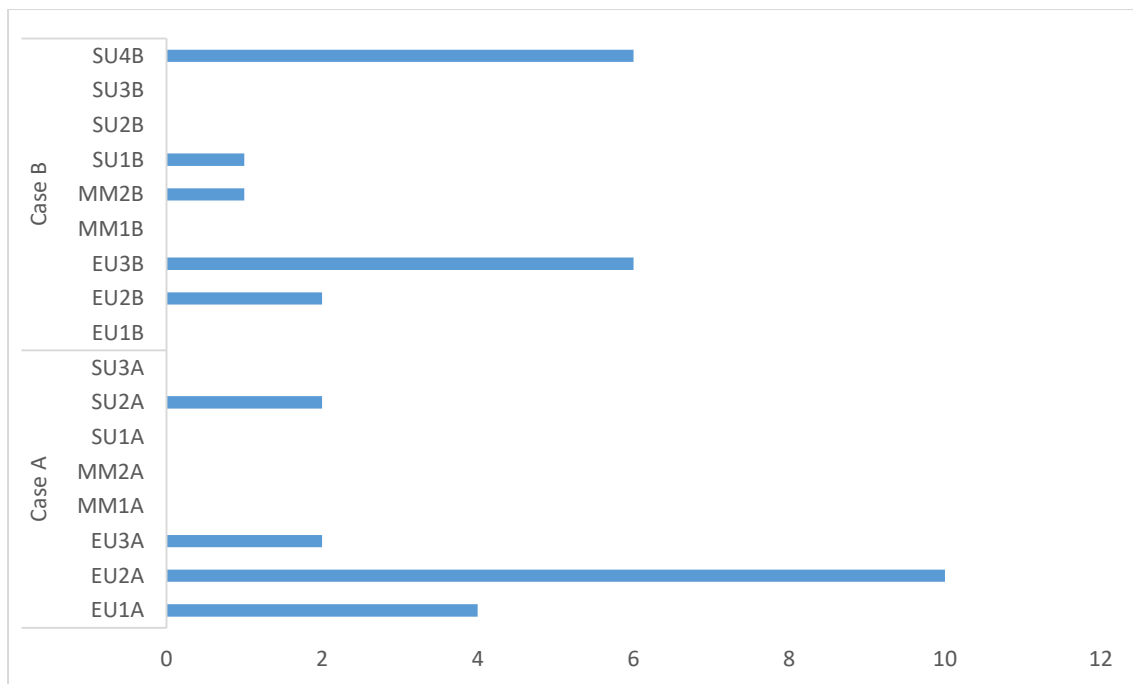


Figure 4-28: Lack of Customisation

The organisation opted for a SAP vanilla implementation. No customisation or modification was allowed, despite the numerous customisation requests from the different business units.

*“When the individual came in, he said we will put down SAP vanilla. You will work in SAP vanilla. And we said given the understanding of the business, we cannot, we will have to do a little bit of remodelling and reconfiguration that was not allowed ...” SU4B.*

The generic solution provided them with limited functionalities. Employees protested that their prior application was more customised and suited to their environment, as it catered to their specific needs and provided them with all their necessary and desired functionalities.

*“Now everything is so kind of generic that you need to go through a long way to get to what you need, whereas before you could just extract that specific report and you had exactly what you needed ...” EU3B.*

The current reporting capability of SAP PPM was perceived as too generic to cater for the requirements of the whole organisation. Nevertheless, managerial employees from different units continued to request customised reports from their technical teams, who would be compelled to draw up the required reports, despite the perceived difficulty levels.

*“... There comes a problem when it comes to reporting because we have various managers from various sections and they want their reports to be developed differently” SU3B.*

Participants stated the software itself was information-intensive; they were required to input a lot of data to complete a particular task and the same information had to be re-entered on different screens.

*“On one of the screen you type in information and on the next screen you have to retype the same information. ... When you type data on one screen and the same data is needed on the next screen, they must duplicate information. Every time, we have to retype the information” SU1B.*

The number of steps required to complete a task increased drastically compared to what they had been doing previously on their preceding processes. It became difficult to understand the purpose of re-entering the same information recurrently. Consequently, employees attributed the capture of repetitive information as a daunting task with the end-users resonating similar thoughts.

*“You have a lot of buttons to push to get one thing done ... so if you do not know what to do then it can be quite tricky” EU3A.*

*“That’s what we did, because it was ridiculous, it was insane to have like more than 300 steps of clicking” EU1A.*

*“The number of steps we had to complete for one task made it worse. No one understood what and why we were doing most of the steps...” EU2A.*

#### 4.5.5 Complex and Rigid User Interface

Complex and rigid user interface refers to instances where users struggle with the complexity of the enterprise solution in terms of navigation, interface design, ease of use and manipulating capabilities of the software.

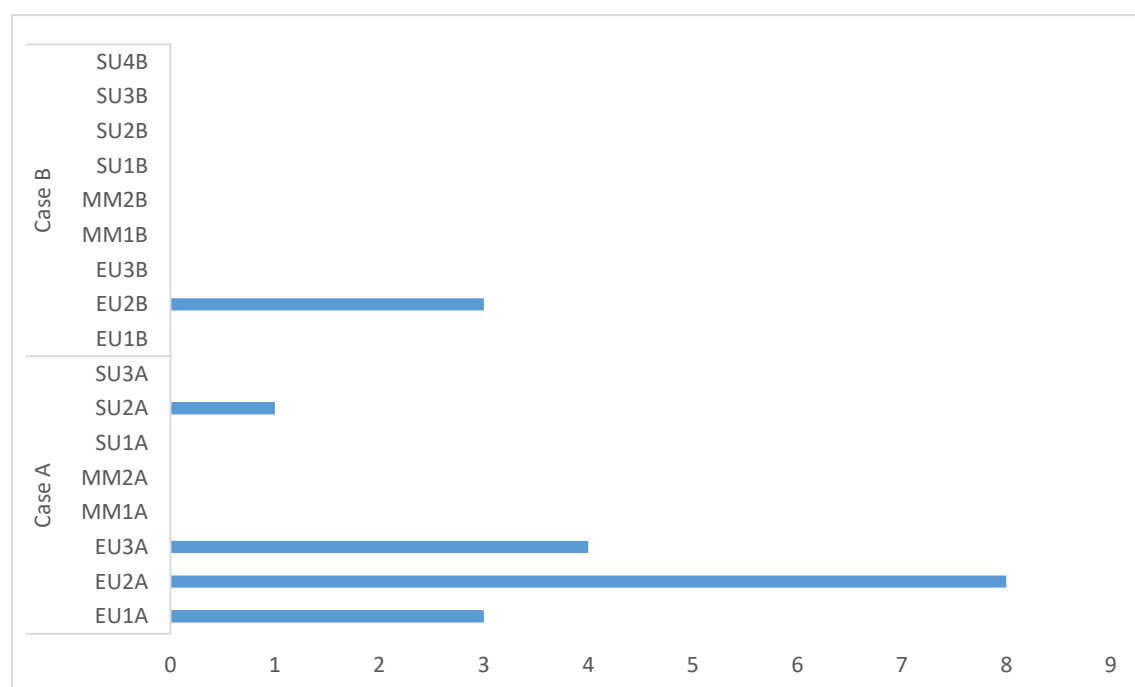


Figure 4-29: Complex and Rigid User Interface



Mainly debated by end-users, typically by those who did not have any prior experience with SAP, end-users argued that ERP systems are complex solutions with poor interface design.

*“I have not used the system before, so I do not understand it. We struggled with the complexity of the system ...” EU1A.*

The ERP system was described as incoherent and the interface design as increasingly complex. The interface did not make much sense to end-users. They vented their frustration as they could not understand the purpose or need of the different functions on the interface.

*“The major challenges were with regards to the system interface ... the design and interface were problematic and challenging ... there should be some order in the interface. It cannot be all haphazard. It is a pity, because you want your first exposure to be a positive one” EU2A.*

The SAP solution was perceived as rigid. Employees compared the lack of data manipulation capabilities of the newly implemented SAP solutions to their previous application.

*To me, SAP is a dead program, it is not like Excel something that you can manipulate. Here you cannot manipulate the data ...” EU2A.*

Moreover, in the event where end-users were required to make any changes to their SAP project schedules, they had to start the data capture process from the beginning. Incorporating any changes to the SAP schedule was a difficult task.

*“cProjects is not very flexible. It is difficult and not very user-friendly. When you make a mistake, you must almost start from the beginning to fix the plan” EU2B.*

#### 4.5.6 Poor Technological Infrastructure

Poor technological infrastructure in this context refers to limitations relating to the speed and response time of the ERP solution, as well as network problems faced by the employees. This challenge was discussed predominantly by managerial level employees from both cases. However, one of the support-users from case B also provided comprehensive insights into the matter while end-users only briefly made mention.

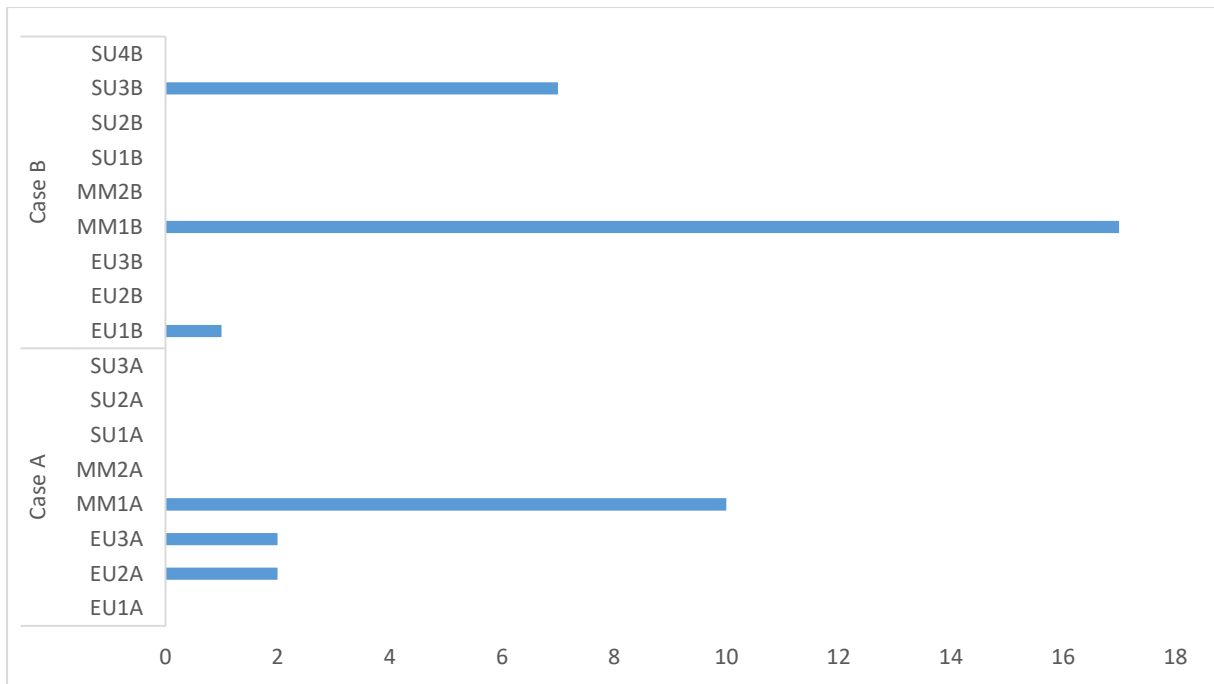


Figure 4-30: Poor Technological Infrastructure

The organisation had undergone a massive SAP implementation where numerous enterprise solutions were introduced concurrently. Employees stated that they had to deal with numerous network issues. At times during training sessions, the ERP solution would not respond and it would take trainers at least one hour to restore the system.

*“Let us say when you go for training, to train the people and I would be sitting there in front of the guys ... and the system just hangs and you would have to call the guys at nationals and you have to wait for an hour before it is back. That was inconveniencing. It was more of a network issue because we were introducing many systems, so there were big hiccups. There were lots of delays in the system as everyone was using it” SU3B.*

*“This whole system would hang up. It was not good ... there were some problems, with the network and WiFi. It was chaotic” EU2A.*

Once the ERP solution had been implemented, end-users had to deal with the slow performance of the system. They found the system performance limiting to the extent of decreasing their productivity. Any transaction would take much longer on the ERP solution when compared to their legacy systems. On average, it would take employees four hours to update a single project on SAP PPM. They could previously have completed three projects in one hour on their legacy systems.

*“The system is supposed to make it easy for you to go with your work but the system’s performance becomes a problem. In other words, it takes you more than ten times as much time for you to do one project as you would have in your traditional system ... in an hour you could do three projects in*

*terms of updating, but now you can only do one project in four hours” MM1B.*

*“The system was not beneficial because, well, in terms of speed, we were told that we would be able to do this a lot more ... we would be able to do our forecasting more efficiently. There were serious speed issues” MM1A.*

## 4.6 Knowledge Challenges

This research unveiled a number of knowledge challenges. Lack of process and technical knowledge amongst different stakeholders and ineffective knowledge management practices emerged as the most prominent challenges. Another noted knowledge challenge referred to the loss of tacit knowledge.

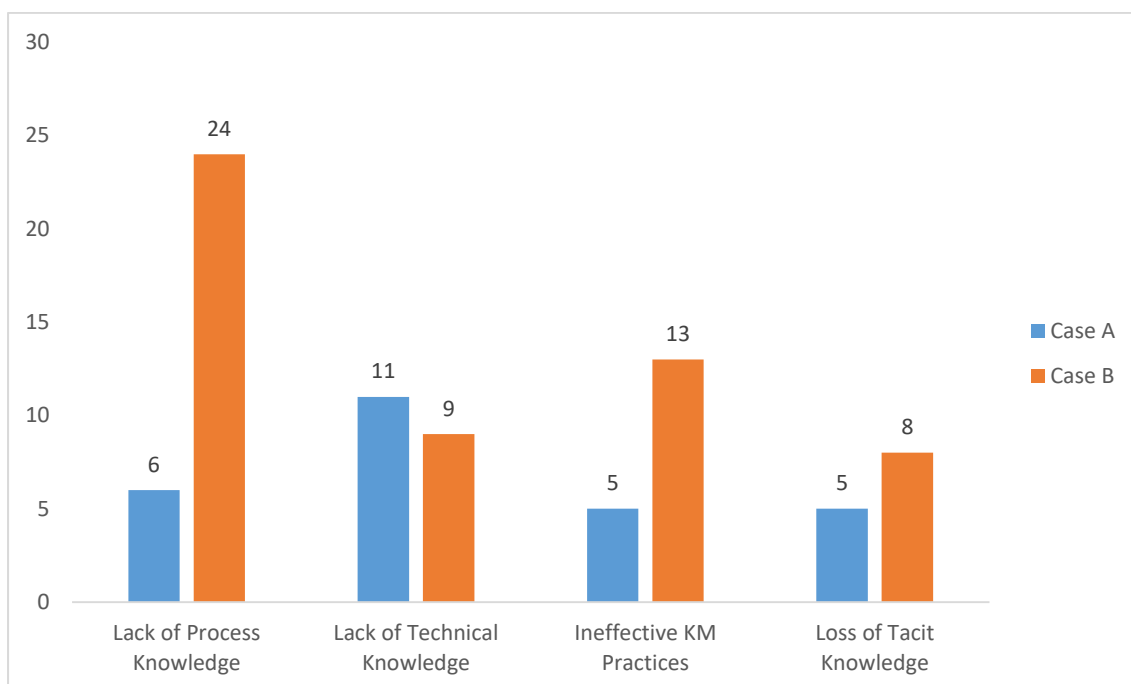


Figure 4-31: Comparative View of Knowledge Challenges

With reference to Figure 4-31, a lack of process knowledge was more prevalent in case B with 24 empirical observations as opposed to six from case A. Lack of technical knowledge was almost equally discussed in both cases with 11 observed occurrences in case A and nine from case B. Five pragmatic observations from case A against 13 from case B revealed ineffective knowledge management practices in the organisation. Eight occurrences relating to the loss of tacit knowledge were unveiled in case B against five in case A.

### 4.6.1 Lack of Process Knowledge

Lack of process knowledge records all instances where participants discuss the lack of process knowledge of key stakeholders, namely in-house trainers, external consultants, executive management and end-users. As depicted in Figure 4-32, while end-users and super-users from both cases commented on the lack of process knowledge as a challenge, only managerial employees from case B made any reference to the former.

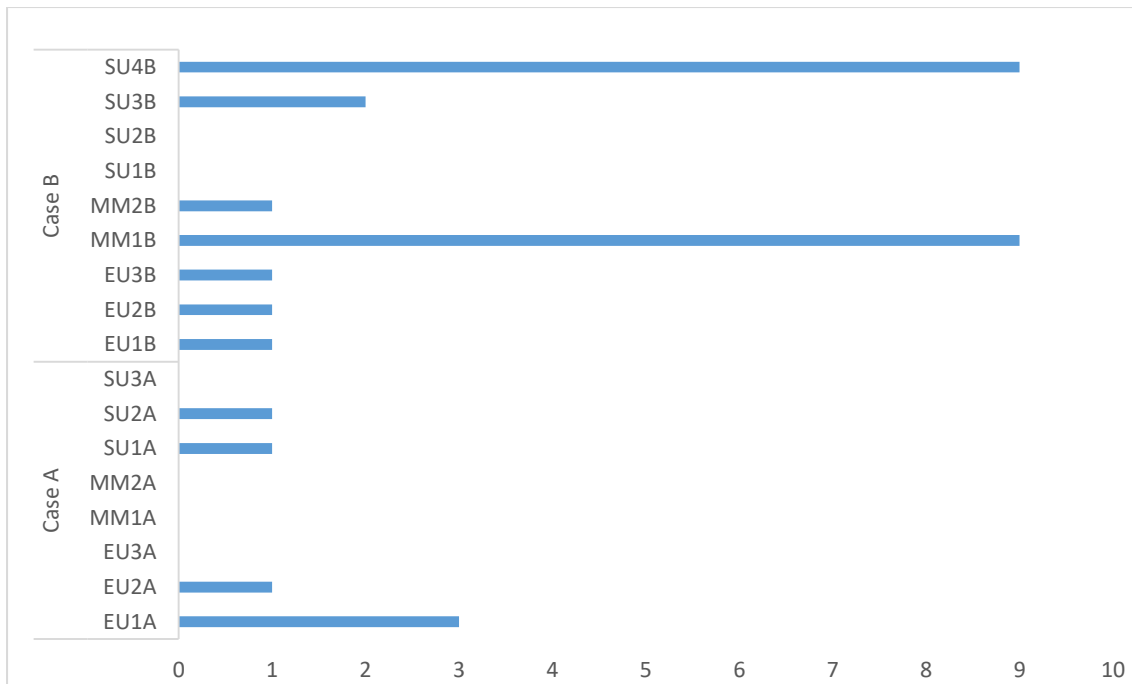


Figure 4-32: Lack of Process Knowledge

#### In-House Trainer's Lack of Process Knowledge

According to the respondents, the trainers lacked core process knowledge. The trainers were not knowledgeable enough and they did not understand the process from the end-users' perspective. Most of the in-house trainers were support IT staff. They were responsible for maintaining and supporting the different applications used by the organisation. Since none of the trainers had any experience as end-users of the system, there were inconsistencies in their understanding of the new system from a user's perspective.

*"However what makes it difficult is that the trainers do not work with the project. They do not understand the process entirely and are not aware of what is happening in the background, they only collect data" EU1A.*

Consequently, the in-house trainers could not define or clarify the ownership of roles and tasks assigned to the different sets of users. No explicit explanation was provided on the information and process flow between the different departments and different stakeholders, as per their role definition.

*"Things were not clear, we have all this data, it was unclear who was supposed to do what. Is it the planner, someone else before planner? There were a lot of unanswered questions which in-house trainers could not answer. Data needed to be put in, we did not know where" EU1A.*

#### Consultants' Lack of Process Knowledge

Respondents complained that external consultants did not have the required knowledge to understand the organisational structure and processes. They further stated that despite their good technical skills, external consultants had not successfully configured and mapped

the organisation's processes to the enterprise system. Employees unanimously agreed that understanding how the business works required expert knowledge that only resided with knowledgeable end-users. Since employees were not involved in the pre-implementation and subsequent phases, external consultants implemented what they deemed suitable for the organisation. Consequently, the implemented system had a number of errors and did not meet users' requirements.

*"... Consultants were not that informed about the way the organisation works. So the SAP consultants were not completely informed. They knew how SAP works and how it is supposed to work but how you physically need to implement it in the organisation, that was the problem and there you needed expert knowledge which you can only get from employees who have been performing that function over the years" MM1B.*

*"Consultants just rolled out what they thought fit and not what the users wanted" MM2B.*

#### **Executive Management's Lack of Process Knowledge**

Executive management's knowledge of the overall business was also questioned. Employees were convinced that executive management lacked essential holistic organisational knowledge. The financial director who commissioned the whole implementation was fairly new to the business. His past expertise came from running a small organisation in the construction industry. Employees reasoned that poor decisions were taken during the implementation as a large organisation has complex dynamics that differ from small organisations. They further attributed a lack of executive management knowledge as a determining factor between a successful and a failed implementation.

*"... on the part of senior management, there was also not a good understanding of the business. It makes a big difference and if I can probably say the critical factor in terms of the two implementations, then there was a good understanding of the business in terms of how [the organisation] works. This time around, it was someone totally new who came, who did not understand the business was setting and going about doing what he wanted to do and the ramifications are there for everyone to see" SU4B.*

*"The person was brand new to [the organisation] came from outside, worked in the construction and also was not also an engineer, he was a finance person ... that was the crux of it ... the [organisation] is a wide business, it has various divisions that work differently ... he could not understand how and why the different divisions worked differently. That in itself is where we fell flat. The individual did not have adequate business knowledge" SU4B.*

### End-users' Lack of Process Knowledge

In-house trainers and support-users pointed out that end-users were mostly only aware of the sub-processes and tasks that they were involved with and seldom showed interest in the holistic organisational processes. As a result, training different sets of users became a challenge as end-users were only concerned with their tasks and responsibilities, not attributing any importance to the learning and understanding of organisational-wide processes.

*"... Most people only know how to do their tasks and did not understand the whole process" SU3B.*

*"Do I really have to know the whole process and what everybody else is doing? Instead of a two-day course, maybe they could have shown me my process in two hours ..." EU2A.*

### 4.6.2 Lack of Technical Knowledge

Lack of technical knowledge encompasses the limited technical expertise of in-house trainers and end-users. As illustrated in Figure 4-33, the lack of technical knowledge was noted as a challenge among participants from all categories of participants with the exception of managerial employees from case A.

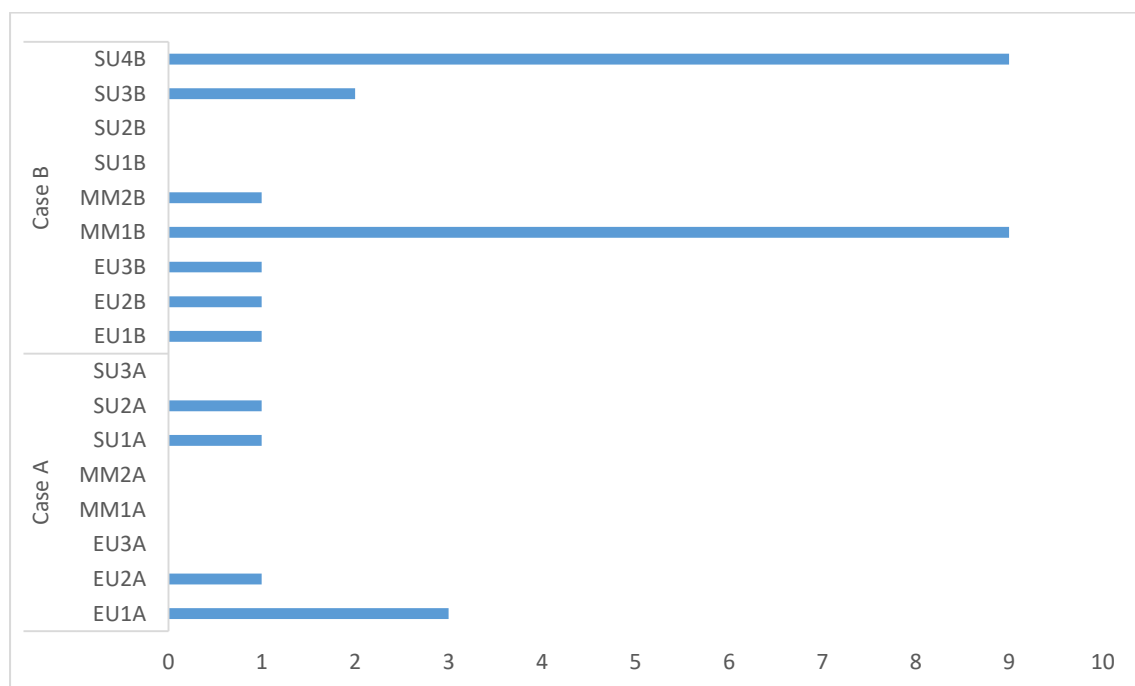


Figure 4-33: Lack of Technical Knowledge

### In-House Trainers' Lack of Technical Skills

Respondents felt that the trainers lacked sufficient key ERP skills as they could not understand and solve the different issues that surfaced during the training sessions.

*"The trainers' were struggling. People asked questions and they could not get it right themselves, the software was not working correctly" EU2A.*

The trainers' technical expertise and competence were questioned as respondents underlined that in-house trainers underwent a 'Train the Trainer' course prior to delivering the end-users' training. They were only exposed to the new solution during the 'Train the Trainer' course where they learnt how to operate the different modules.

*"I am not sure how good the people who were training us were as they never used or worked on the system, it felt that they were not very qualified either. ... They needed to learn SAP; they are now helping us learn about SAP. There were no outside consultants" EU1A.*

The above claims were substantiated by the in-house trainers themselves who claimed that the 'Train the Trainer' course was a short course run by external SAP consultants. In-house trainers reasoned that the way the training sessions were conducted were not conducive as they needed more time to understand the systems. The course was too short for them to be adequately equipped with the required technical expertise to tackle the different system-related challenges that surfaced during the training. Gaining the required technical know-how is a challenging, time-consuming process and in-house trainers had to first ensure that they fully understood the system before training others.

*"The trainer's training was three days long, I feel it was not long enough. It took quite a while to understand the system. ... You just had to work through the simulations and get the information that you need and try to understand for yourself and then train others" SU1A.*

Moreover, they were expected to pick up any further changes or fixes effected on the ERP solution and were often left to deal with uncertain situations while delivering the training to the users.

*"And for us [in house trainers], for any changes on the system, you will have to pick it up. And you will have to see what to do with it while you are in the classroom" SU3B.*

To address this shortcoming, in-house trainers preferred to seek the help of consultants in situations where they felt that they did not have the required technical knowledge to train the employees. Not only were consultants better equipped to assist the employees with their numerous system-related queries; they also could intervene where required as they had a far better understanding of the ERP solution.

*"At one stage, I requested one of the [consultants] to come down and train my guys on cProjects because I felt, I won't be doing justice if I train them ... so they were able to answer [the questions] and object when necessary. I cannot object, I did not develop the system" SU3B.*

### End-Users' Lack of Technical Skills

End-users were criticised for not having the required technical skills to adapt to the new enterprise system. Technically, they were not seen as adequately competent to deal with the numerous ERP challenges. Senior employees compared the current situation to their

previous implementation and asserted that they had witnessed a drop in the technical expertise of end-users.

*“Another challenge that I did not mention is within the organisation it does not also help if your users are not very knowledgeable and very strong on systems. So that compels the problem. If I look at 1999, the users who we had were well skilled, had all the necessary technical skills and they wanted to do their job. ... So what we have now is a system that is not working and users who were not very knowledgeable in terms of what was expected from them in the first place. This does not give a very good end-result” SU4B.*

Support-users emphasised the difficulty experienced while training end-users because of their lack of technical expertise.

*“The worst thing was the lack of technical competence of people. They still did not know how to use SAP PPM a week prior to us having to start use. So I had to retrain them, so they could understand this is what is happening” SU3B.*

#### 4.6.3 Ineffective Knowledge Management Practices

Ineffective knowledge management practices encompass all instances whereby employees made reference to the lack of processes that enable knowledge sharing, transfer and re-use. This challenge was mentioned by all three categories of employees from case B, however, only end-users and managerial employees from case A referred to this challenge.

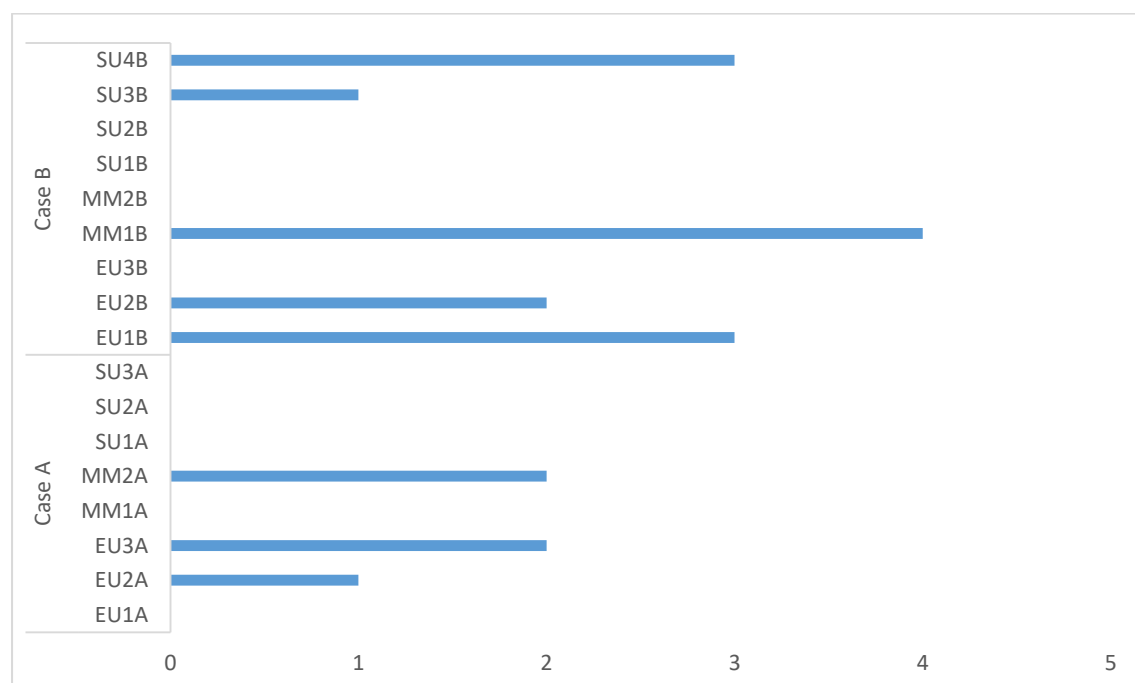


Figure 4-34: Ineffective Knowledge Management Practices

Employees emphasised the lack of knowledge management policies in the organisation. Unsatisfactory mechanisms enabling transfer of tacit experiences implied that employees



could not re-use the existing knowledge of prior implementations. Expressing their disappointment, employees stated that the organisation had been through prior enterprise system implementations but they could not base themselves on past experiences since the existing knowledge was not adequately documented. There was not a standardised way of creating, sharing and distributing knowledge across the organisation.

*“... you cannot go through such a process as if it is your first. The problem is that obviously there has been enterprise systems which have been implemented for years in the organisation. So there is knowledge on implementing an enterprise solution but the biggest question is was that knowledge documented so that you could share it easily with the divisions. When you are starting to develop and implement an enterprise system, what is the existing knowledge that we have?” MM1B.*

Moreover, there was not a knowledge-sharing culture between departments which operate in silos. Business units seldom think of how to share knowledge across the organisation.

*“We are not catering for any knowledge mechanisms ...” SU4B.*

Information and knowledge did not flow seamlessly between the different regional operating units either.

*“My complaint was that we get the wrong information ... they do not share the information on our side and they are supposed to share the knowledge” SU3B.*

Furthermore, the poor training sessions and limited interaction with consultants contributed to ineffective knowledge transfer and, hence, the lack of understanding of the enterprise solution.

*“SAP Consultants trained the people in [the organisation] to give the training. But there was no exposure to the consultants, I did not have any interaction with them, so the knowledge was not effectively transferred. The training did not help to understand the system” EU2B.*

*“The only way for knowledge transfer is the training that we did for SAP; the simulation training was not great for me” EU3A.*

#### 4.6.4 Loss of Tacit Knowledge

Loss of tacit knowledge encompasses all instances where employees discuss the knowledge drain and the knowledge gap amongst different stakeholders. Managerial and super-users predominantly alluded to this challenge, with a single end-user from case B referring to this particular challenge.

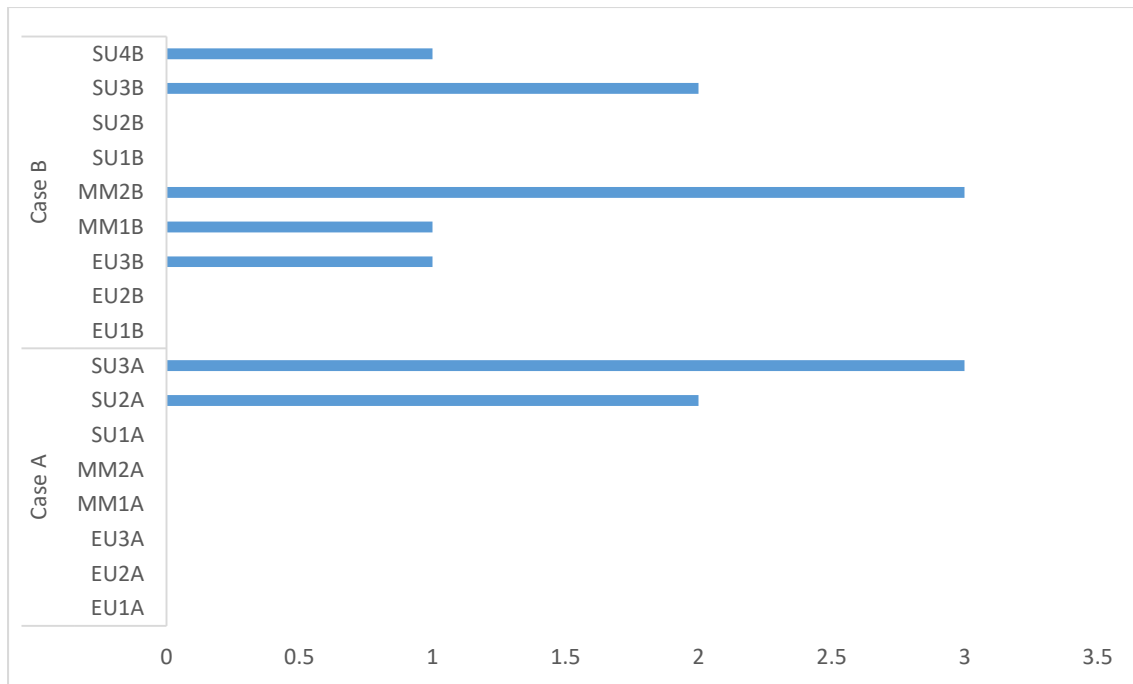


Figure 4-35: Loss of Tacit Knowledge

### Knowledge Drain

From a knowledge standpoint, another key concern put forward by the employees was the knowledge drain throughout the project implementation lifecycle. They had experienced knowledge drain during the ERP implementation lifecycle. Employees reasoned that the loss of any key employee or consultant has an adverse impact on the project in terms of knowledge loss and the project momentum.

*“... The momentum of the whole project disappears with the loss of key people. We have experienced the loss of tacit knowledge for crucial projects” SU3A.*

Knowledge drain with any team changes increases the risk of loss of tacit knowledge which, in turn, may jeopardise the implementation, if no prompt and corrective actions are undertaken. Employees asserted that they were not aware of any measure or processes in place to minimise knowledge drain.

*“... There needs to be some way of managing the teams to ensure that key tacit knowledge is not lost. I am not aware of any processes of how it is managed” SU3A.*

### Knowledge Gap between different Stakeholders

Another noted knowledge challenge was the knowledge gap experienced amongst different sets of stakeholders due to the difficulty in translating tacit knowledge, resulting in information and meaning being lost in interpretations. Employees explained that understanding engineering requirements and needs were already perceived as a difficult task. Translating those needs into technical specifications to stakeholders who did not operate in an engineering environment added another layer of complexity.

*“Translating tacit knowledge is not always an easy task, a lot gets lost in the interpretation. It is always difficult to integrate engineering interpretation into code. If you get a consultant who only understands the system to interpret and understand an engineering output, which on its own is already difficult, is just an additional challenge” SU2A.*

The absence of shared experiences amongst various stakeholders resulted in stakeholders associating different meanings and interpretation of the requirements based on their unique understanding and beliefs. This, in turn, led to perceived difficulty in translating tacit knowledge to explicit knowledge.

*“We do not understand each other because the gap is in the language. I talk in my technical IT language and end-users speak in their technical engineering language and the others would be speaking in their advanced financial language, how do we translate our tacit knowledge effectively to make sure that everyone has shared business knowledge ...” SU3B.*

#### 4.7 Summary of Cross Comparative Findings

Participants from both cases unanimously agreed that they faced numerous shortcomings during the implementation process. Table 4-1 summarises the number of empirical observations across each case.

*Table 4-1: Comparative View of Unveiled ERP Implementation Challenges*

<b>Summary of Challenges</b>	<b>Case A</b>	<b>Case B</b>
<b>Organisational Challenges</b>	<b>41</b>	<b>33</b>
Weak Leadership	12	21
Pre-Existing Organisational Challenges	29	12
<b>Management Challenges</b>	<b>56</b>	<b>40</b>
Coercive Management	40	31
Lack of Middle Management Support	16	9
<b>Project Management Challenges</b>	<b>79</b>	<b>107</b>
Time Constraints	28	26
Cost Constraints	13	13
Personnel Constraints	16	8
Planning and Scoping constraints	8	16
Poor Implementation Strategy	9	24
Lack of Process Redesign	5	20
<b>Change Management Challenges</b>	<b>287</b>	<b>279</b>
Resistance to Change	55	53
Low Employee Morale	48	40
Lack of Perceived Change Benefit and Value	49	42
Ineffective Change Management Initiatives	26	32

Inadequate User Involvement	8	35
Inadequate User Requirement	19	39
Sub-optimal Training	82	38
<b>Technical Challenges</b>	<b>97</b>	<b>210</b>
Lack of Core Functionality	11	77
Data Errors	11	46
Lack of Customisation	18	16
Complex and Rigid User Interface	16	3
Poor Technological Infrastructure	14	25
Limited Integration, Limited Offline Accessibility and Use of Multiple Systems	27	43
<b>Knowledge Challenges</b>	<b>27</b>	<b>54</b>
Lack of Process Knowledge	6	24
Lack of Technical Knowledge	11	9
Ineffective KM Practices	5	13
Loss of Tacit Knowledge	5	8

The unveiled challenges were prevalent in both cases. In the end, employees from case A, backed by the middle managers, did not use the ERP solution, despite attending the organisational training. On the other hand, middle management from case B enforced usage of the enterprise solution in spite of the noted shortcomings. Employees from case B acceded to executive and middle management's pressure and, unwillingly, began using SAP PPM and SAP cProjects. Further probing revealed that middle management from both cases had negotiated and reached an agreement whereby employees from case B would be entering the required data on behalf of employees from case A.

#### 4.8 Proposed Taxonomy of ERP implementation Challenges

Figure 4-36 presents a taxonomy of the identified ERP implementation challenges unveiled in the previous sections.

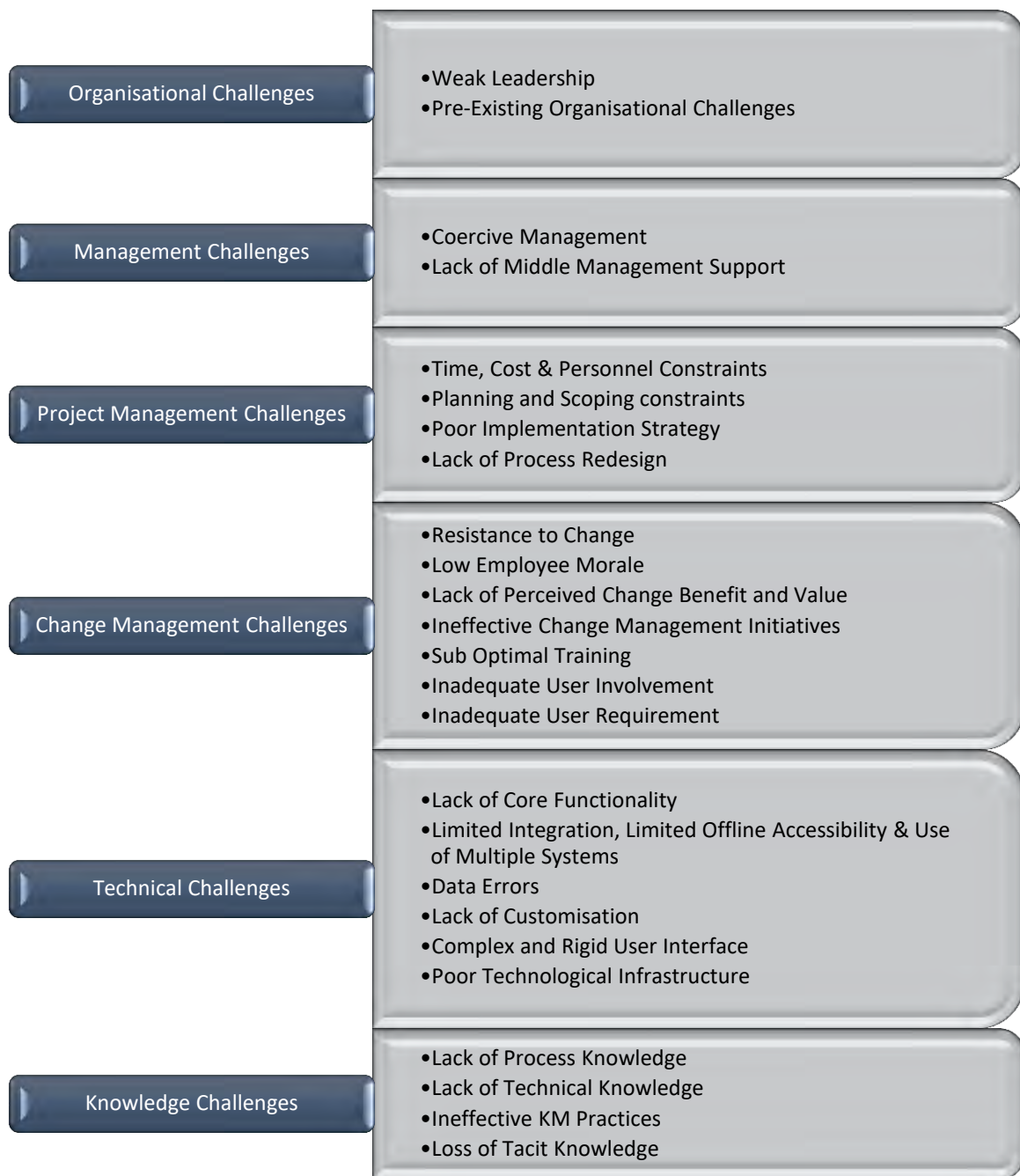


Figure 4-36: Taxonomy of ERP Implementation Challenges

The subsequent sections compare and contrast the different dimensions of the proposed taxonomy to the literature. The findings are summarised and then validated against existing literature.

## 4.9 Organisational Challenges

The two dimensions of organisational challenges unveiled through this research include weak leadership and pre-existing organisational challenges. The different dimensions of the organisational challenges relating to ERP implementations have not been clearly delineated in the literature, with only a few studies focusing on this particular category (McAdam & Galloway, 2005; Zhang et al., 2005).

#### 4.9.1 Weak Leadership

As with the empirical observations, weak leadership is categorised as an organisational ERP implementation challenge. Wagner & Antonucci (2009) corroborate the findings of this study by emphasising that the frequent changes in leadership in public sectors negatively affect large scale ERP implementations.

This study identifies a lack of clear and shared vision and a division and mistrust in leadership as weak leadership. This grouping is supported by the literature where leadership is characterised as the ability to formulate a strategic vision whilst providing a strong advocacy of the vision and mobilising followers to accomplish the objectives through committed and coherent directives (Jarvenpaa & Ives, 1991; Ke & Wei, 2008; Sarker & Lee, 2003; Zmud, 1980).

The translation of the organisational vision was perceived as flawed by the lower echelon who failed to relate to the vision. The reminiscent power struggle noted at executive level led to a disharmony of interest between different stakeholders, leading to a situation where employees questioned and mistrusted executive management's strategic objectives. The literature supports the findings with a number of studies attributing a lack of clear and shared vision and conflict of interests within the leadership as reasons accounting for ERP implementation failures (Dey, Clegg, & Bennett, 2010; Mapetere & Mhonde, 2012; Sarker & Lee, 2003; Umble et al., 2003).

#### 4.9.2 Pre-Existing Organisational Challenges

The pre-existing organisational challenges faced by the organisation make the context of this ERP implementation unique. The case organisation was already facing a number of challenges prior to the initiation of the SAP implementation lifecycle. The pre-existing challenges in this context have been identified as a prevailing financial crisis, staff shortage and lack of uniform practices. Implementing an ERP solution under these existing organisational challenges proved to be detrimental to the case organisation. Sammon and Adam (2010) are in agreement with this statement as they claim that many of the implementation problems that enterprises undergo result from their initial circumstances. Prior literature, however, places little emphasis on the presence of pre-existing organisational challenges which enterprises may be undergoing prior to undertaking an ERP implementation project; their impact on the resulting implementation outcomes is overlooked (Sammon & Adam, 2010). Through the empirical observations of this study, the significance of these challenges and the impact they have on the ERP implementation process cannot be ignored.

In this context, the implementation of the ERP solution was seen as the panacea for the severe financial crisis faced by the establishment. Arguably, the decision to opt for a rushed implementation can be seen as a flawed strategic decision as implementing an ERP solution is, in actual fact, a considerable financial investment that may add to the financial burden of the organisation (Davenport, 1998; Markus & Tanis, 2000).

Referring to existing staff shortages, the transition to the new ERP solution occurred at a time where numerous business units were already operating at a sub-optimal capacity.

Similar findings were identified by Kumar et al. (2003) who recommend that organisations should not underestimate the prevailing in-house resource constraints. Moreover, an ERP implementation should be planned adequately whilst ensuring that there are not any prevailing resource constraints (Abdinnour-Helm et al., 2003; Aladwani, 2001; Sammon & Adam, 2010).

Each business unit had to reassess its work practices in order to comply with a standard vanilla process. In this scenario, seeking standardisation and shared understanding for the entire organisation proved to be futile, due to the lack of uniform practices and cultural diversities. The fact that the organisation did not have a strong corporate culture, with each business unit operating as a silo with its own unique set of practices and beliefs, made the SAP vanilla implementation more demanding. Literature acknowledges that the lack of coordination amongst different units and cutting across cultural diversity is seen as a major barrier to ERP implementation success (Ke & Wei, 2008; Kim et al., 2005). These challenges were also discussed in the literature review chapter in sections 2.23 and 2.29.

## 4.10 Management Challenges

The management challenges unveiled as part of this study refer to coercive management and lack of middle management support.

### 4.10.1 Coercive Management

A noted challenge of this particular ERP implementation was the coercive measures exerted by executive management. The ERP implementation was driven by a newly appointed CFO who had limited knowledge of the internal processes. The general perception was that executive management, in particular, the CFO, imposed the ERP solution upon the business without any prior assessment or analysis of the impact of such an undertaking. Despite showing reticence towards the direction taken by executive management, employees could not express their viewpoints. Although the literature acknowledges the use of coercive power as a means to threaten and punish others in an attempt to force usage of the ERP solution (Boonstra, 2006; Kerr, Houghton, & Burgess, 2007; Rivard & Lapointe, 2012), coercive management has not been categorised as an implementation challenge. However, based on the empirical observations, this study acknowledges excessive use of coercive pressure by management as a key implementation challenge.

### 4.10.2 Lack of Middle Management Support

Contrary to the literature where the focus on middle management support has seldom been highlighted, this study categorises the lack of middle management support and buy-in as a major challenge in public sector implementations. Middle management from case A did not support the initiative and showed strong opposition to the new ERP solution. Middle management's refusal to abide by the imposed rules was hailed as strong and assertive behaviour.

While the literature attributes prime significance to the role of top management during the ERP implementation lifecycle (Bingi et al., 1999; Light, Holland, & Wills, 2001; Nah et al., 2001; Somers & Nelson, 2001; Umble et al., 2003), fewer studies have emphasised the role

of middle management during the implementation lifecycle. Yu (2005) ascribes middle management support as one of the root causes affecting use of ERP solutions in the post-implementation phase, while Garg (2010) classifies the lack of middle management support as a CFF. The findings of this study are substantiated by Sommer (2011) who underlines the power of middle management in public sector ERP implementations and the resulting consequence of a lack of support on the implementation outcome. A lack of commitment and buy-in from middle management negatively impacts the ERP implementation. Middle management's ability to deploy different tactics to delay the implementation process, whilst anticipating an ultimate future change in leadership which would typically change the focus and priority of projects, is a common challenge faced by public sectors (Sommer, 2011).

## 4.11 Project Management Challenges

Similar to the literature findings (Chen et al., 2009; Y. Kim et al., 2005; Kumar et al., 2003; Momoh et al., 2010), the project management challenges unveiled by this study consist of time, cost, personnel, scoping and planning constraints, poor implementation strategy and lack of process redesign.

### 4.11.1 Time constraints

The organisation struggled to schedule realistic timelines to critical activities such as configuration, testing and training. Consequently, critical activities were either omitted or carried out hurriedly. The omission of critical activities due to tight project schedules are underlined by Wong et al. (2005) and Kumar et al. (2003) who link unrealistic timelines to project failure. The long duration of an ERP project was also highlighted through this study. Despite the fact that the organisation rushed through the pre-implementation and implementation phases, the post-implementation phase ran from 2011 to the end of 2015. In an attempt to resolve the numerous ERP implementation challenges, the post-implementation phase became a project on its own. The findings of this study provide strong backing for the long duration of the lifecycle of an ERP implementation project which can run from five to eight years, depending on the complexity of the business processes (Bingi et al., 1999; Yusuf et al., 2004).

### 4.11.2 Cost constraints

The fact that the organisation was already facing a financial constraint implied that the ERP solution was implemented under a restrained budget. Moreover, throughout the implementation lifecycle, the organisation relied on external consultants sourced from overseas. The services of the consultants continued for more than two years after the implementation, until the point where the organisation decided to release all its external consultants due to the high consultancy fees. The unveiled cost constraints are in line with the findings from the literature where high consultancy fees are listed as one of the major hidden costs of an ERP implementation (Bingi et al., 1999; Kumar et al., 2003). In actual fact, consultancy fees may consume up to 30% of the implementation budget (Bingi et al., 1999; Mabert et al., 2003).

In addition, as depicted in section 4.3.2, the organisation froze a number of high impact projects directly related to the ERP implementation. Integration functionalities promised to



employees were, therefore, not delivered. The literature refers to integration initiatives as much more costly than the acquiring ERP software itself, as an integration project needs to account for the high costs of consultants, system integrators and, in most cases, the cost of replacing the existing technological infrastructure (Mabert et al., 2003).

#### 4.11.3 Personnel Constraints

The failure of engaging an adequate project team is seen as a major impediment in this study. The organisation struggled to recruit the necessary skills required for the key implementation functions. The findings of this study are aligned to the findings of the literature (Bingi et al., 2000; Soja, 2011) where personnel constraint is noted as a major impediment in developing countries. Moreover, the project team was seen as imbalanced, relying exclusively on consultants and managerial employees with minimal focus on end-users. As noted by Chen et al. (2009), as a result of management's failure to source critical IT skills due to the perceived lack of in-house skills, organisations are increasingly relying on external consultants to fill in the experience void (Chen et al., 2009).

#### 4.11.4 Planning and Scoping Constraints

Planning and scoping constraints are also noted project management challenges that the organisation faced. The empirical findings highlight the organisation's failure to adequately plan the implementation, as a result of which critical implementation tasks were either bypassed or poorly executed. The literature corroborates the findings of this study. Scholars have emphasised the complexity associated with planning an ERP implementation and the impact of poor planning on the implementation outcome (Chen et al., 2009; Garg, 2010; Gargeya & Brady, 2005; Mandal & Gunasekaran, 2003).

In terms of project scope, the implemented SAP vanilla solution was described as a poorly conceptualised and scoped solution. The scope of the solution was perceived too narrow to cater for the needs of the whole organisation. The literature substantiates the findings of this study. While the implementation of a SAP vanilla solution is usually a recommended strategy to minimise scope creep, the shortcoming of this approach is that the solution might be too limited to cater for the requirements of the business (Bingi et al., 1999; Upadhyay et al., 2010).

#### 4.11.5 Poor Implementation Strategy

Employees criticised the organisation's decision to opt for a rushed implementation strategy and a vanilla solution. Characterised as a poorly executed endeavour, little thought was given to understanding the impact of such an overhaul. The employed implementation strategy did not take into consideration the prior status quo and existing issues of the organisation. While the findings of this study characterise a poor implementation strategy as a critical implementation challenge, the ERP implementation literature has commonly attributed implementation strategy as a strategic CSF (Finney & Corbett, 2007). Common ERP implementation strategies decisions may refer to the use of either a big bang or phased approach, use of a SAP vanilla or customised solution, use of a centralised or decentralised approach and the involvement and selection of resources (Scott & Vessey, 2000; Shanks et al., 2000).

However, drawing from the literature on implementation strategy, scholars concur that implementation strategy is undeniably seen as a difficult and time-consuming undertaking (Beer & Eisenstat, 2000; Egelhoof, 1993; Hrebiniak, 2006; Rajasekar & Khoud, 2014). Organisations often fail in their change initiatives due to the poor implementation of their strategies (Jooste & Fourie, 2009). Scurrying in such complex endeavours will, eventually, lead to failure (Hrebiniak, 2006).

#### 4.11.6 Lack of Process Redesign

Employees claimed that the SAP implementation was executed without any prior process remodelling and redesign. The findings indicate that contrary to employees' expectations, the SAP implementation did not optimise their processes. Employees saw their processes as lengthier, more complex and time-consuming. Lack of process redesign is cited as a major ERP implementation risk (Aloini et al., 2007). As per literature, one of the primary reasons for organisations to adopt ERP solutions is to improve their processes through BPR, in an attempt to ultimately improve organisational performance (Davenport et al., 2004). In order to achieve an increased organisational performance, it is imperative for organisations to restructure and redesign their processes (Bingi et al., 1999; Somers & Nelson, 2001). Comparing the empirical findings of this study to the literature, the case organisation gave little consideration towards process optimisation and laid little emphasis on redesign efforts.

### 4.12 Change Management Challenges

This research acknowledges the major role of change management as an implementation challenge (Aladwani, 2001; Al-Mashari & Al-Mudimigh, 2003a; Finney & Corbett, 2007; Lee, 2008; Momoh et al., 2010), and emphasises the failure of organisations to regard an ERP implementation as an organisational change process as opposed to solely a technical change (Davenport, 1998; McAdam & Galloway, 2005; Skok & Legge, 2002).

The research also addresses the concerns of Finney and Corbett (2007) who claimed that change management constructs are not clearly delineated in the literature. This research groups change management into the six sub-categories: resistance to change, employee morale, perceived change benefit and value, change management initiatives, training and user involvement and user requirement.

#### 4.12.1 Resistance to Change

Resistance to change, as defined in this study, consists of the following themes: user resistance to change, partial usage of the system and resistant organisational culture. Resistance to change was one of the prominent emerging categories with employees from both cases exhibiting strong resistant behaviour throughout the implementation process. The findings of this study are aligned to the literature where resistance to change is categorised as a key implementation challenge and listed as both a CSF and a CFF factor (Kim et al., 2005; Kumar et al., 2003; Soja, 2011; Wong et al., 2005).

#### 4.12.2 Lack of Perceived Benefit and Value

Perceived usefulness is described as *“the degree to which a person believes that using a particular system would enhance his or her job performance”* (Davis, 1989, p.320). In the present study, employees did not associate any operational benefits with the new ERP solution. In effect, they claimed that the ERP solution made it harder for them to complete their daily tasks and negatively impacted their productivity. Lack of perceived usefulness has been commonly used in the literature to refer to a lack of perceived benefit and value, as discussed in this study (Amoako-Gyampah, 2007; Kim & Kankanhalli, 2009).

The findings further reveal a disharmony of interests amongst different stakeholders. Employees professed that the ERP solution solely catered for executive management’s needs and, on an operational front, the benefits were minimal. These observations are substantiated by the literature, particularly, the five dimensions of ERP benefits framework by Shang and Seddon (2000) who classify perceived benefits as operational, managerial, strategic, IT infrastructure and organisational. The authors argue that different stakeholder groups have different interests, resulting in different associated benefits, thus, organisations should not expect an ERP solution to yield benefits from all the five dimensions (Shang et al., 2000).

#### 4.12.3 Low Employee Morale

The ERP implementation negatively impacted employees’ morale. Employees at all levels displayed a negative attitude towards the change. Similar trends were identified in the literature body, thus corroborating these findings. Maintaining employee morale during the ERP implementation lifecycle is a challenge and difficulties encountered during the implementation will more likely reduce employees’ morale, contributing towards a negative impact on the implementation outcome (Bingi et al., 1999; Kumar et al., 2003; Schniederjans & Yadav, 2013; Sommer, 2011).

#### 4.12.4 Ineffective Change Management Initiatives

This research groups ineffective change management initiatives into the following categories: the absence of a clear change policy, inadequate support structures and ineffective communication channels. The organisation’s failure to implement an adequate change policy led to a poor and unstructured change process, resulting in the absence of adequate support structures and effective communication channels. A communication breakdown between top management and lower echelon employees was highlighted as a key concern, with employees stressing that top management did not effectively communicate the need for the new solution, its ensuing benefits and limitations.

Numerous studies have discussed the significance of a clear change policy to manage the ERP implementation as a structured change process (Aladwani, 2001; Kwahk & Lee, 2008; Motwani et al., 2005). Kwahk and Lee (2008) emphasise that a change policy is crucial in determining the required approach and protocols to overcome the implementation challenges. The absence of adequate support structures (Kumar et al., 2003; Motwani et al., 2005), communication channels (Al-Mashari & Al-Mudimigh, 2003; Barker & Frolick, 2003; Soja, 2011) and reward incentives (Kim et al., 2005; Motwani et al., 2005) are recognised

change management challenges (Liu & Seddon, 2009). This study, however, does not allude to the lack of reward incentives as an implementation challenge.

#### 4.12.5 Inadequate User Involvement

This study establishes inadequate user involvement as a major implementation challenge. Two categories of inadequate user involvement were revealed, namely, minimal and wrong user involvement. Not only was user involvement limited during the different implementation phases; the rightful users were also not involved as part of the implementation team. Employees discussed the numerous difficulties arising due to inadequate user involvement during the implementation lifecycle. The literature corroborates the findings of this study (Kwahk & Lee, 2008; Mabert et al., 2003; Umble et al., 2003; Zhang et al., 2005). Barker and Frolick (2003) further discuss the need for organisations to understand their workforce in order to select and involve their best and most knowledgeable employees to be part of the implementation.

#### 4.12.6 Inadequate User Requirement

The requirements of the solution were seen as inaccurate and incomplete. Consequently, the implemented ERP solutions did not meet user requirements and were, in retrospect, characterised as misfits to the business. The significance of poor user requirements on the implementation outcome has been highlighted by different researchers, albeit through use of different terminologies (Kumar et al., 2003; Nah & Delgado, 2006; Rajapakse & Seddon, 2005; Wang, Klein, & Jiang, 2006; Wong et al., 2005). The literature largely refers to the term 'ERP software misfit' to classify an ERP solution which does not meet user requirements (Wang et al., 2006; Wong et al., 2005). As discussed in the literature, the misfits are seen as a deeper challenge in emerging economies, as most ERP software embody European or US industry practices, values and assumptions (Rajapakse & Seddon, 2005; Soh et al., 2000; Wang et al., 2006; Wong et al., 2005).

#### 4.12.7 Sub-optimal Training

Numerous training challenges were unveiled as part of this study. The training structure was perceived as disorganised while the training content was poorly conceived, poorly customised and poorly documented. A gap between the training solution and the actual implemented ERP solution was noted, where the training solution differed from the actual implemented solution. Moreover, the training infrastructure was seen as inadequate. The case organisation had underestimated the significance of adequate training and did not attribute much importance to the education and development of its employees. The literature corroborates the findings of this study. Inadequate training is classified as a critical implementation challenge (Kumar et al., 2003; Onofrei et al., 2004; Soja, 2011) and organisations seldom correctly estimate their training requirements (Kumar et al., 2003; Soja, 2011; Umble et al., 2003).

### 4.13 Technical Challenges

An ERP implementation exposes an organisation to numerous challenges inherent to the ERP solution itself. This research unveils numerous challenges related to the ERP solution

itself, namely, functionality, integration, data, customisation and interface limitations. Poor technological infrastructure forms another noted challenge of this category.

Some of the mostly debated challenges in the literature refer to excessive customisation, the ERP software misfit (lack of desired functionality to support the existing business processes), inadequate software testing, environment misfit including infrastructure challenges and poor system performance, and data quality challenges such as inaccurate data and bugs in the system (Kumar et al., 2003; Lee, 2008; Yusuf et al., 2004). Technical challenges are predominantly uncovered in the shakedown phase once the ERP software has been deployed in the organisation (Kumar et al., 2003; Markus et al., 2000).

#### 4.13.1 Lack of Core Functionality

The SAP vanilla solution lacked required and desired functionalities, implying that critical tasks could not be completed through the sole use of the ERP solution. The reporting capability of the ERP solution was, therefore, deemed inadequate. Critical information could not be retrieved and data could not be easily manipulated to the required formats without extensive reprogramming or bespoke tools. Referring to the implementation of cProjects, employees could not conduct numerous analysis tasks due to the limited functionality of cProjects. As per section 2.13.3, the fundamental gaps between the required functional and output requirements of the organisation and the ERP solution are referred to as functional and output misfits (McKerlich et al., 2013; Soh et al., 2000). Prior literature has recognised functional and output misfits as critical challenges relating to the ERP solution (Rajapakse & Seddon, 2005; Shiang-yen, 2011; Soh et al., 2000; Soja, 2011).

#### 4.13.2 Limited Integration, Limited Offline Accessibility and Use of Multiple Systems

One of the core objectives of the SAP implementation was to integrate SAP PPM and the organisation's GIS solution. The integration, however, proved to be more challenging than initially anticipated and the implemented solution hardly provided any integration prospect. The literature validates that an ERP solution does not guarantee a complete integration solution (Davenport, 1998; Kumar et al., 2003). Organisations struggle to achieve the desired level of integration as they categorise the integration attempts as complex, time-consuming and costly (Themistocleous et al., 2001) and an ongoing activity that lingers long after the core implementation has taken place (Davenport et al., 2004).

Moreover, the fact that the ERP solution could not be accessed remotely was a noted challenge, making it incompatible with the needs of the business. Accessibility of an ERP is seen as a desired characteristic of an ERP system and is positively correlated to usefulness and employees' performance (Fan & Fang, 2006). However, supporting evidence from existing literature, classifying offline ERP accessibility as an implementation challenge, is lacking. This research, therefore, conjectures that accessibility of an ERP solution from remote regions particularly in developing countries can be a significant challenge.

Moreover, employees relied on multiple systems to accomplish their assigned responsibilities. While use of multiple systems to supplement the limitations of an ERP solution is a common strategy (Kumar et al., 2003; Panorama Consulting Solutions, 2014), the duplication of data remains a significant challenge (Shiang-yen, 2011). Ironically,

eliminating duplication of effort is perceived as one of the benefits of implementing an ERP solution (Panorama Consulting Solutions, 2015).

#### 4.13.3 Data Errors

Numerous data migration errors occurred due to wrong conversion rules used during migration, leading to an inaccurate data reflection on the ERP solution. The data errors were only picked up after the 'Go-Live' date, supporting the findings of Yusuf et al. (2004) as discussed in section 2.28. Prior studies have acknowledged that data migration is a daunting task and the prevalence of data errors during the migration process cannot be ignored (Haug, Arlbjørn, & Pedersen, 2009; Vosburg & Kumar, 2001). Numerous studies list data errors as a CFF (Amid et al., 2012; Somers & Nelson, 2004; Umble et al., 2003; Zhang et al., 2005).

#### 4.13.4 Lack of Customisation

The case organisation was implementing a SAP vanilla solution nationwide, across all its business units. The SAP vanilla implementation resulted in loss of core, customised functionalities which employees relied on to conduct their daily tasks. As in the literature, a SAP vanilla solution is deemed more appropriate for implementations involving fewer users and still requires a minimal degree of customisation, particularly when it comes to reporting (Parr & Shanks, 2000). While the literature unanimously acknowledges excessive customisation as a CFF (Aloini et al., 2007; Chen et al., 2009; Momoh et al., 2010; Rothenberger & Srite, 2009), inadequate customisation also poses various challenges to the organisation (Bingi et al., 1999; Chen et al., 2009; Soh et al., 2000).

#### 4.13.5 Rigid and Complex User Interface

Employees critiqued the rigid and complex user interface of the SAP solution as they felt that their legacy solutions were far more user-friendly. Employees felt that data could not be easily manipulated and completing a simple task became a complex endeavour. The rigid and complex user interface was primarily discussed by end-users and seemed to be more prevalent amongst end-users who did not have any prior SAP exposure.

The usability of the SAP interface has been extensively debated in the literature (Amoako-Gyampah, 2007; Keong, Ramayah, Kurnia, & Chiun, 2012; B Scholtz et al., 2010; Brenda Scholtz, Calitz, & Cilliers, 2011; Singh & Wesson, 2009; S. T. Urus, Molla, & Teoh, 2011). However, the literature mostly refers to the term 'ease of use' which is the opposite term for complexity (Keong et al., 2012). Several researchers lay emphasis on the development of ERP systems with well-designed interfaces which are easy to use and learn for enhanced usability (Lin, 2010; Singh & Wesson, 2009). Moreover, the negative relationship between ease of use and prior exposure has been corroborated by Amoako-Gyampah (2007), implying that the lesser the prior ERP exposure, the higher the perceived level of difficulty and reluctance to learn the new solution.

#### 4.13.6 Poor Technological Infrastructure

The impact of poor technological infrastructure was already a noted concern in the training sessions. Unfortunately, the situation remained unresolved post-implementation. Once employees started using the solution, they struggled with the slow network and response



time of the ERP solution, amongst other challenges. The findings of this research lend support to the claims that developing countries are more likely to face problems related to their IT infrastructures where poor technological infrastructure is often cited as a CFF (Huang & Palvia, 2001; Rajapakse & Seddon, 2005; Soja, 2011; Urus et al., 2011a).

#### 4.14 Knowledge Challenges

The knowledge dimensions discussed in this study refer to the lack of process and technical knowledge, a lack of Knowledge Management (KM) practices and loss of tacit knowledge. The findings of this study, therefore, extend the knowledge challenges unveiled in section 2.15.

##### 4.14.1 Lack of Process and Technical Knowledge

A lack of shared knowledge amongst stakeholders was noted at all levels in the organisation. Consultants lacked core process knowledge, while end-users were only concerned with their sub-processes and did not have a good understanding of organisational knowledge. Both in-house trainers and end-users lacked the required technical SAP knowledge. Moreover, a lack of organisational knowledge was also exhibited by the implementer of the ERP solution who was a recently appointed CFO.

The findings are supported by the literature. Stakeholders partaking in an implementation should have a good knowledge of the organisation's processes and information systems; however, stakeholders' lack of required process and technical knowledge remains a prominent implementation challenge (Robey et al., 2002; Soja, 2011; Wang, Chia-Lin Lin, Jiang, & Klein, 2007; Wong et al., 2005). While Wong et al. (2005) acknowledged the lack of knowledge exhibited at different echelons, Soja's (2011) study emphasised the process and technical knowledge challenges faced by employees during an ERP implementation.

##### 4.14.2 Ineffective KM Practices and Loss of Tacit Knowledge

Adequate KM practices were not put in place to manage the knowledge diffusion. The organisation did not employ any prior implementation knowledge and there were hardly any knowledge-sharing practices between different business units. The lack of knowledge sharing between different business units, team members and employees has contributed to many ERP implementation failures (Jarvenpaa & Staples, 2001; Jones, Cline, & Ryan, 2006; Pan et al., 2007). While Pisano (1994) noted the significance of using prior knowledge as a basis of new knowledge, the difficulty in accessing prior implementation knowledge has been recognised (McKerlich et al., 2013).

Knowledge transfer tactics from consultants to in-house trainers were also identified as ineffective. Prior literature acknowledges knowledge transfer challenges (Jones et al., 2006; Onofrei et al., 2004; Volkoff et al., 2004; Wong et al., 2005). The knowledge transfer challenges between the consultants and the organisation have been discussed in section 2.15.

Another knowledge challenge referred to the loss of tacit knowledge. The loss of tacit knowledge during the implementation process could not be ignored. The high turnover of skilled personnel led to a knowledge drain, accentuating the loss of tacit knowledge

throughout the implementation lifecycle. The impact of loss of skilled personnel and tacit knowledge on the implementation outcome has been emphasised in numerous studies (Chan & Rosemann, 2001; Chen et al., 2009; Jarvenpaa & Staples, 2001; Markus et al., 2000).



## 5 Dynamic and Systemic Interplay of the ERP Implementation Challenges

This chapter provides empirical findings to depict the dynamic and systemic causal interplays between the different identified challenges. It answers the following question: *How do the ERP implementation challenges interact with each other from a systemic perspective?*

### 5.1 Organisation of Chapter

In section 5.2, through use of an initial co-occurrence analysis, early relationships are identified. New groupings are then created in section 5.3. Subsequently, each new grouping is assigned a unique code, followed by the generation of a new set of co-occurrence analysis in section 5.4. The validity and authenticity of the relationships between the new groupings are also discussed. The resulting dynamic interplay between the ERP implementation challenges is proposed in section 5.5. A comprehensive analysis of the relationships is subsequently undertaken in sections 5.6 to 5.15. Key propositions are derived and discussed in section 5.16.

### 5.2 Detecting Early Relationships

Twenty-seven emerging meso-level challenges were identified in chapter four. An initial co-occurrence analysis through the ATLAS.ti software provided an understanding of the dynamic interplay between these challenges. The objective of this exercise was to differentiate between the dominant themes and the weaker ones. The use of a co-occurrence analysis is particularly effective in that it allows the researcher to distinguish the strength of a relationship between two themes through the frequency of occurrence and value of the c-coefficient. Co-occurrence analysis through ATLAS.ti displays both the frequency of co-occurrence and the c-coefficient value of the relationship between two themes.

While the co-occurrence frequency represents codes that co-occur across the data, the c-coefficient demonstrates “*the strength of the relation between two codes similar to a correlation coefficient*” (Frieze, 2013, p. 291). The c-coefficient varies between 0 and 1. A c-coefficient value of 0 implies that the codes do not occur concurrently whereas a c-coefficient of 1 implies that two codes always co-occur. The c-coefficient value is calculated as follows:

$c = n_{12} / (n_1 + n_2) - n_{12}$  where  $n_{12}$  = co-occurrence frequency of two codes  $c_1$  and  $c_2$ , and  $n_1$  and  $n_2$  are their occurrence frequency (Frieze, 2013).

### 5.3 Refined Groupings

Following the initial co-occurrence analysis, new groupings of the meso-level challenges are derived to consolidate the weaker meso-themes with dominant ones. Closely associated variables displaying high correlation and similar behaviours are also grouped under one meta-theme. The purpose of this step is to demonstrate a parsimonious systemic schematic

of the interplay between the identified challenges, whilst maintaining the richness of the findings. A grouping is deemed suitable in cases where either one of the following conditions is met.

- a. Meso-level variables only display stable co-occurrences with one or two selected variables. Individually, these variables exhibit non-dominant relationships with most of the remaining meso-level variables portraying only unstable and weak relationships. Pairing these variables with selected dominant variables where they depict some degree of inter-correlation strengthens the relationship with the remaining variables whilst reducing the number of themes.
- b. Selected meso-level variables display high inter-correlation and similar cause and effect behaviours. This step entails a detailed analysis of each meso-theme within each category to identify coherent inter-relationships and behaviours with the remaining variables.

Careful consideration was taken in order to ensure a minimal loss of granularity so as to preserve the richness, and meaningful and essential information within the data. Through a highly iterative process of co-occurrence analysis, dialogical reasoning and cautious examinations of the inter-relationship of each theme, 20 ERP implementation challenges were condensed into five meta-themes. The seven meso-level implementation challenges remained unchanged. Table 5.1 depicts the refined groupings of the meso-level themes and a short description of the amalgamation.

*Table 5-1: Grouping Table Depicting Refined Meso Challenges*

	Meta Theme	Meso-Level Themes Merged	Justification
<b>1</b>	Poor Implementation Strategy	Time Constraints	In the first instance, time, cost and personnel constraints were grouped as project resource constraints due to their high degree of inter-correlation. Lack of process redesign only depicted some correlation with poor implementation strategy; the two variables were subsequently grouped as poor implementation strategy. Poor implementation strategy, poor planning and scoping constraints and project resource constraints depicted similar cause and effect behaviours. They were further regrouped as 'poor implementation strategy'. The term 'poor implementation strategy' is henceforth used to refer to the project challenges.
		Cost Constraints	
		Personnel Constraints	
		Planning and Scoping constraints	
		Poor Implementation Strategy	
		Lack of Process Redesign	
<b>2</b>	Ineffective Change	Ineffective change management	Both constructs displayed similar cause and effect relationships. Prior studies have

	Management Initiatives	Initiatives	categorised training as a change initiative (Aladwani, 2001; Kumar et al., 2003).
		Sub-optimal training	
3	Negative Affective Outcome	Lack of perceived change benefit and value and	Both constructs displayed similar cause and effect. Negative affective outcome is described as the perceived usefulness and satisfaction of the system, users' attitude and anxiety towards the system (Calvert & Seddon, 2006; Gupta, Bostrom, & Huber, 2010).
		Low employee morale	
4	ERP Solution Inadequacies	Lack of core functionality	Lack of core functionality, limited integration, limited offline accessibility and use of multiple systems, data errors, complex and rigid user interface and, lack of customisation were merged as these challenges related to the limitations of the actual ERP solution. These challenges displayed similar cause and effect relationships and a high degree of inter-correlation. Poor technological infrastructure was subsequently added to the grouping due to its similar cause and effect behaviour. The term 'ERP solution inadequacies' is henceforth used to refer to the technical ERP challenges.
		Limited integration, limited offline accessibility and use of multiple systems	
		Data errors	
		Complex and rigid user interface	
		Lack of Customisation	
		Poor technological infrastructure	
5	Lack of Shared Knowledge	Lack of process knowledge	Lack of technical and process knowledge were merged as they displayed similar cause and effect relationships. Ineffective knowledge management practices and loss of tacit knowledge depicted high correlations with a lack of technical and process knowledge, but did not show any dominant relationships with any other variables. The four knowledge variables were subsequently merged. The term 'lack of shared knowledge' is henceforth used to refer to the knowledge challenges.
		Lack of technical knowledge	
		Ineffective knowledge management practices	
		Loss of tacit knowledge	

## 5.4 New Iteration of Co-occurrence Analysis and Analysis of the Relationships

The resulting 12 challenges were each assigned a unique code, as depicted in Table 5-2.

*Table 5-2: Refined Meso-level challenges*

	Refined Meso Level Challenges	Assigned Code
<b>1</b>	Weak Leadership	WL
<b>2</b>	Pre-Existing Organisational Constraints	EOC
<b>3</b>	Coercive Management	CM
<b>4</b>	Lack of Middle Management Support	LMM
<b>5</b>	Poor Implementation Strategy	PIS
<b>6</b>	Resistance to Change	RTC
<b>7</b>	Negative Affective Outcome	NAO
<b>8</b>	Ineffective Change Management Initiatives	ICM
<b>9</b>	Inadequate User Involvement	IUI
<b>10</b>	Inadequate User Requirement	IUR
<b>11</b>	ERP Solution Inadequacies	ESI
<b>12</b>	Lack of Shared Knowledge	LSK

A new iteration of co-occurrence analysis portraying the key relationships between the 12 meta-challenges was subsequently undertaken. The new groupings resulted in higher c-coefficient values between the variables, with very few unstable relationships. The relationships between the resulting 12 meso-level challenges were reassessed and a thorough analysis of the corresponding interrelations between the variables was undertaken to distinguish the causal relationships. This exercise was conducted for all the different relationship combinations, as depicted in Table 5.3. The co-occurrence analysis, however, did not provide information to distinguish between cause and effect relationships between the variables. The relationships, therefore, had to be thoroughly examined by the researcher, through a detailed analysis of the associations, to identify the authenticity of each causal relationship. For the purpose of this research, a c-coefficient  $> 0.04$  was used as a benchmark to identify the dominant relationships from the weaker ones. The dominant relationships were noted while those with no c-coefficients were discarded in future analysis and synthesis. Both the displayed c-coefficient values and the frequency of inter-occurrences were examined and the relevant quotations were reviewed several times to ensure the validity and accuracy of the detected relationships. Weak and unstable relationships were only excluded from the dataset after the confirmation of the lack of supporting evidence and irrelevance to the case.

Table 5-3: Co-occurrence Coefficient Values of the Meta-Challenges

	WL	EOC	PIS	LMM	CM	RTC	NAO	ICM	IUI	IUR	LSK	ESI
WL	0	0,03	0,07	0,07	0,05	0,02	0,04	0,03	0,03	0,02	0,04	0,02
EOC	0,03	0	0,06	0,06	0,04	0,06	0,03	0,01	0,01	0,03	0,01	0,02
PIS	0,07	0,06	0	0,01	0,09	0,05	0,09	0,06	0,03	0,05	0,03	0,16
LMM	0,07	0,06	0,01	0	0,03	0,05	0,03	0,01	0	0,01	0,01	0,06
CM	0,05	0,04	0,09	0,03	0	0,07	0,09	0,07	0,06	0,04	0,04	0,03
RTC	0,02	0,06	0,05	0,05	0,07	0	0,19	0,06	0,03	0,03	0,01	0,09
NAO	0,04	0,03	0,09	0,03	0,09	0,19	0	0,11	0,03	0,07	0,05	0,22
ICM	0,03	0,01	0,06	0,01	0,07	0,06	0,11	0	0,04	0,02	0,11	0,12
IUI	0,03	0,01	0,03	0	0,06	0,03	0,03	0,04	0	0,23	0,16	0,03
IUR	0,02	0,03	0,05	0,01	0,04	0,03	0,07	0,02	0,23	0	0,14	0,08
LSK	0,04	0,01	0,03	0,01	0,04	0,01	0,05	0,11	0,16	0,14	0	0,02
ESI	0,02	0,02	0,16	0,06	0,03	0,09	0,22	0,12	0,03	0,08	0,02	0

## 5.5 Dynamic Interplay of ERP Implementation Challenges

Through cautious analysis of the relationships between the different groupings, as discussed in section 5.4 and through dialogical reasoning and sense-making, the following model was conceptualised.

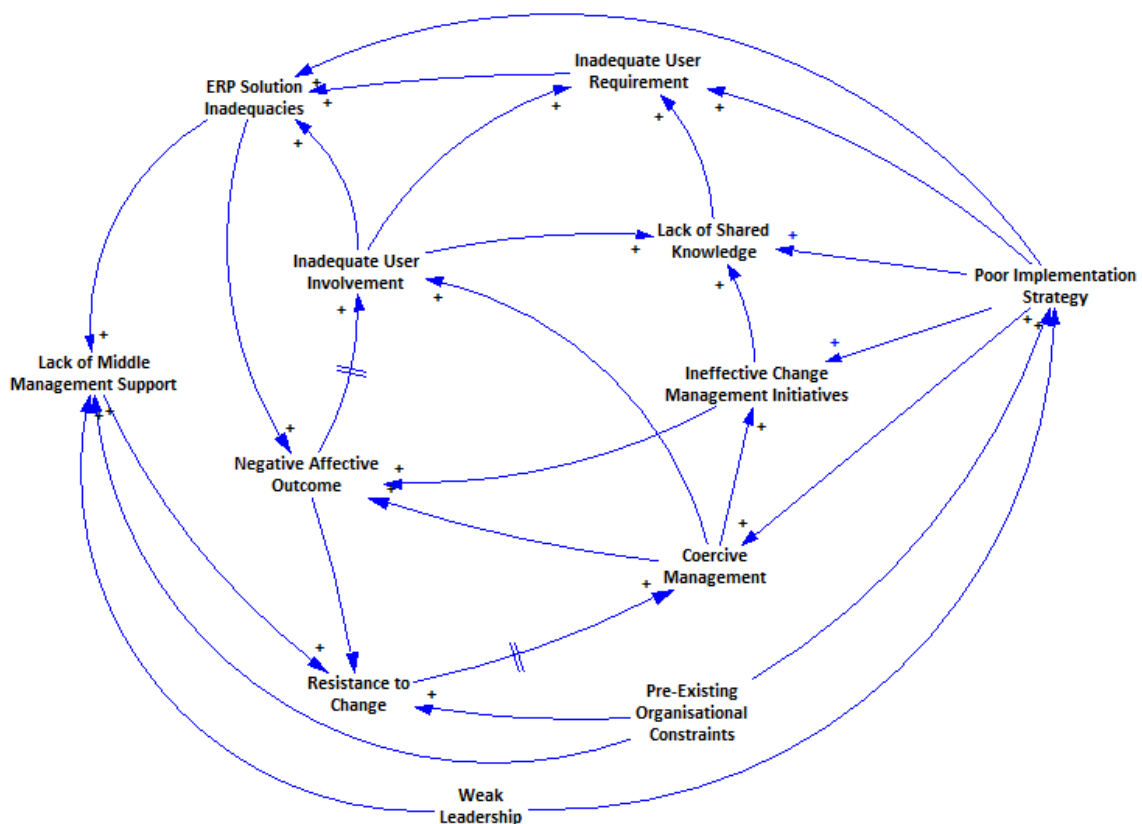


Figure 5-1: Causal Model Depicting the Systemic Dynamic Interplay of the ERP Implementation Challenges

The prevailing causal relationships of each challenge are now discussed. Each relationship is described using the relationship evidence from the different interviews.

## 5.6 Causal Conditions Leading to Resistance to Change

The causal conditions leading to resistance to change refer to a negative affective outcome, pre-existing organisational conditions and lack of middle management support. These relationships are illustrated in Figure 5-2 and are described in the subsequent sections.

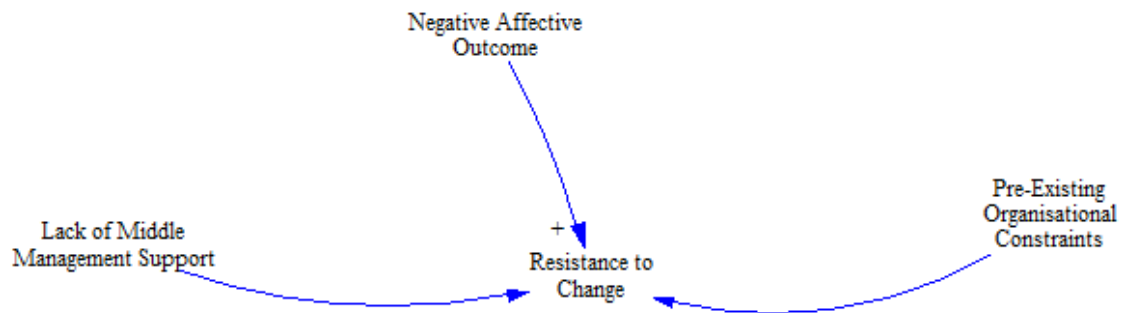


Figure 5-2: Causal Conditions Leading to Resistance to change

### 5.6.1 Negative Affective Outcome – Resistance to change

#### Lack of perceived Change Benefit and Value – Resistance to change

A strong causal relationship between a lack of perceived change benefit and value and resistance to change is observed. One of the principal motivators for end-users using new software relates to the direct benefit derived from use. In this particular case, participants argued that neither did the ERP solution simplify their tasks nor did it allow them to accomplish their daily operations more efficiently. Hence, since the use of the enterprise solution did not benefit them in any way, they were disinclined to use it.

*“I have been here for a long time, for the past seven years. My opinion is that I need to deliver on projects and if something gets implemented that is **not to the benefit of speeding up the process** and project and in some way **is not helping to make things easier**, then I do not think it is worthwhile for me to do it .... **So I decided not to do it** if it is going to be a detriment to the project” EU2B.*

Drawing further comparisons between the new enterprise solution and their existing legacy system, the interviewees explained that not only was their previous solution more efficient and effective; it was also more intuitive and had all the required functionalities for them to easily achieve their tasks. In comparison, the new solution made it harder for them to complete their tasks and did not add any additional benefit, hence they did not see the need for adopting the new solution.

*"I have gotten used to the **previous program**, it seems like the most logical steps to use. ... I do not see the reason to move to SAP. Nothing that I feel I can say hey I can do this now which I couldn't do earlier. We should not have used SAP at all, scrap it"* EU1A.

Some of the participants provided a more pragmatic reason to describe the relationship between resistance to change and lack of perceived change benefit and value. They explained that because the enterprise solutions, in particular SAP PPM, were implemented for strategic purposes, end-users were more bound to resist use as they hardly saw any gains arising from use of the ERP solution. The fact that the enterprise solution was implemented for top management to exert increased visibility and control on operational activities did not translate into direct benefits to the end-users.

*"Enterprise systems generally are not liked or used appropriately. The issue there is that enterprise systems require users to input data in the system but **the value or the benefit of the system is realised somewhere else**. In fact, such a project is SAP PPM. The **users** who capture those projects **will not necessarily see the benefit** of doing that but senior management will have the benefits of being able to prioritise projects. In fact, there is a disconnect there because [the organisation] does not look at the incentives of the users to start using SAP correctly ..."* SU3A.

#### Low Employee Morale – Resistance to change

A prominent relationship is noted between low employee morale and resistance to change. Owing to their prior numerous exposures with numerous deficient systems, employees responded negatively to any new change in the organisation. Not only did they feel that the new systems were not fittingly implemented, the changes occurred too frequently, further dampening their spirits, resulting in employees' reluctance to accept change.

*"... but the organisation is very bad with systems. We have got loads of software. I've probably used about 100 different systems here. I am not even exaggerating here. **Everyone is tired of new systems**. Every time a new one comes out there, they just change, not even giving the previous one a chance ... **we are just delaying use**"* MM1A.

Participants felt that it was unfair for the organisation to implement major enterprise solutions and immediately expect end-users to accept the new solution. Negative behaviours against the system should have been anticipated and the organisation should have been prepared to deal with the initial commotion and destructive behaviour.

*"It is not fair to introduce such a huge system and expect users to adapt immediately knowing how **resistant people** can be especially with regards to systems. If you are introducing a system, obviously they will be resistant ... and they will **exhibit negative behaviour** and have **a negative attitude towards the system**"* SU3B.

## 5.6.2 Pre-Existing Organisational Constraints – Resistance to change

### Lack of Uniform Practices – Resistance to Change

Employees were adamant that the different business units functioned such that a common work culture could never be established. Each business unit had different modes of operation owing to the nature of their distinct functions, work practices, business jargon and culture. Their processes and requirements differed to such extents that they, somehow, all required a certain, unique level of customisation to satisfy their core process requirements. Implementing an enterprise solution invariably assumes that a certain degree of standardisation can be achieved throughout the enterprise which, in this particular situation, could not be achieved. This was arguably one of the fundamental challenges the organisation faced, on account of dissension between the different operating units and regions.

*“The problem was historically that **each of the divisions had some sort of independence**. So people from GX would manually run projects very differently from those in DX. The liberty is that **for enterprise systems to be used by all the divisions, there needs to be some level of standardisation of the different processes that are being used, which invariably leads to resistant behaviour**” SU3A.*

Employees also discussed the cultural differences between the various regions, affecting the individual beliefs and behaviour. The diverse organisational culture prevailing in the business units and regions, in this instance, contributed to certain business units exhibiting stronger resistant behaviour as opposed to others.

*“The regions are different. It is definitely different in the way we approach things. ... You have got a culture that says we will comply or at least try it out as opposed to **a culture that says no** this is new, we do not know what it is, we like the way we used to do things. Then the switching from one software to the other or using a new software **will take longer**, it will be more painful **as people are more resistant** ” MM2A.*

## 5.6.3 Lack of Middle Management Support – Resistance to Change

A lack of middle management support magnifies resistant behaviour. Middle management did not support the initiative and was completely opposed to the use of the enterprise solution. The two case studies provided some insightful evidence of this relationship. Initially, middle management from case A showed their disapproval towards the new enterprise solution. Consequently, end-users from the unit emulated the behaviour and showed amplified aggression and resistance. The quotes help to portray the scenario.

*“But I [middle manager], from forecasting, I **have been reluctant to use the [enterprise solution]** ... until it's working properly” MM1A.*

*“My manager was not involved. He was not even on the course with us ... **why must I spend more time doing that**” EU2A?*



On the other hand, middle management from case B showed less aggression and tried to encourage their employees to use the system.

## 5.7 Causal Conditions Leading to Negative Affective Outcome

The noticeable causal conditions relating to negative affective outcomes are inadequacies of the ERP solution, coercive management and ineffective change management initiatives. Figure 5-3 depicts these causal relationships.

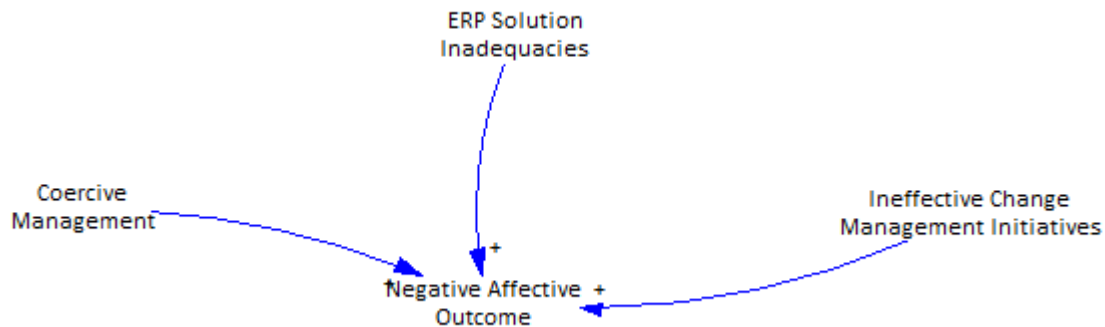


Figure 5-3: Causal Conditions Leading to Negative Affective Outcome

### 5.7.1 ERP Solution Inadequacies – Negative Affective Outcome

Inadequacies of the implemented ERP solution are credited as a significant cause of negative affective outcome. The numerous limitations of the ERP solution experienced by employees and poor technological infrastructure contributed to the negative affective outcome. These relationships are discussed below.

#### Lack of Core Functionality – Negative Affective Outcome

The lack of core functionalities of the ERP solution resulted in a lack of perceived change benefit and value. Employees struggled to complete their allocated tasks with the new ERP solution.

*“... we have been asking for **the reporting functionalities**, to have proper reports. It does not help to input the data in one system and **the users cannot extract the data**. There is **no benefit for them** to use the system” MM2B.*

The fact that enterprise solution did not provide extensive analytical functionalities and lacked key reporting functionalities resulted in end-users’ resentment towards the solution.

*“For us to populate the schedule on cProjects would just be for **monitoring purposes**. It won’t have any kind of value for the project manager because ... cProjects is not very flexible and it is very limited with what kind of functions it has. You can just only populate dates, **you can’t do any impact analysis** ...” EU2B.*

*“... before you used to get extensive reports from the system to tell you how to manage your projects. At the moment, **there are serious limitations in the ERP systems, our reports add no value to us.** They have implemented those very expensive systems **and I don’t even get the benefit out of it** because it is not giving users what they want” SU4B.*

#### Lack of Customisation – Negative Affective Outcome

Moreover, the implemented SAP vanilla solution was not customised to cater for the unique needs of the different business units. The limited functionalities of the generic solution added to employees’ frustration. Their prior legacy solution was equipped with unique customised functionalities which employees lost after the implementation, leaving them with a lengthier process.

*“But the issues were common to the other modules. I can go to [other business units] and **the guys will show the same frustrations.** ... Can you believe this system? **We can’t reconfigure the system, it is not allowed**” SU4B.*

*“A lot **of our customised reports were lost** ... so it actually made our work slower. **It was just a very irritating time,** trying to figure out what are the new reports and what can you work with and what can’t you work with” EU3B.*

Moreover, the enterprise solution was not adequately configured. Employees were required to constantly enter duplicate information. Using the new enterprise solution to complete assigned tasks took much longer than anticipated, contributing to their negative behaviour towards the solution.

*“... **it was ridiculous; it was insane** to have, like, more than **300 steps of clicking**” EU1A.*

*“I mean **there are things that can be automated** ... If I am filling 100 cells, are they all important? **I feel I am not a user rather I have been abused**” EU2A.*

#### Data Errors – Negative Affective Outcome

The implemented solution had a number of data errors. The solution did not function as intended and employees could not complete any of their required tasks without first encountering a few data errors. Employees were exasperated as they struggled to work with the new solution.

*“They were **mapping things incorrectly** so it made things very difficult, the **first year was crazy** ... **they did not transfer the data correctly** so it created **a nightmare for the one year**” EU3B.*

Adding to their frustration, end-users were forced to use and adapt to a sub-standard solution which was still being developed and fixed.

*“... you implement a semi-workable system with **numerous data errors** and ... **you want to fix it as it is being used**. And this is one thing **that frustrates the users** ...” MM1B.*

#### Limited Integration, Limited Offline Accessibility and Use of Multiple Systems – Negative Affective Outcome

Owing to the limited integration and offline accessibility of the enterprise solution, core tasks had to be completed through manual workarounds or through use of various multiple systems. At times, employees had to perform the same task simultaneously in two different systems. The duplication of effort further compounded the negativity towards the ERP solution. The quotes below depict employees' exasperation.

*“It was **frustrating as hell**. A lot of work had to be done outside the **system**” EU3B.*

*“... the **duplication of the task** that they do, **capture the information on one system, and capture it again on the other system**. Then it was a **real pain**” SU3B.*

#### Complex and Rigid User Interface – Negative Affective Outcome

The negative first-hand experiences employees had with the ERP solution's interface during the training phase left them afflicted with a negative mind-set. Employees lamented about the lack of manipulation capabilities of the enterprise solution and the complexity of the user interface.

*“To me, **SAP is a dead program**, it is not like Excel something that you can manipulate. **Here you cannot manipulate the data**. There is **no value that I can add to it**. It is **all so frustrating**” EU2A.*

Employees attributed the overly complex and extravagant software applications as an inhibitor to their productivity.

*“... We struggled with the **complexity of the system**, they **do not make you more productive**” EU1A.*

#### Poor Technological Infrastructure – Negative Affective Outcome

Other limitations of the enterprise solution pointed to its slow performance. Due to the sub-standard performance of the system, employees found the enterprise solution to be incompatible to suit their current needs. The fact that it took them much longer to accomplish a task when compared to their legacy system contributed to employees' antagonistic behaviour.

*“The major challenge was the overall **system performance** and that is linked to that was **the morale of the staff**. ... It is still taking **four hours to update one project** in cProjects ... we could earlier update **four projects in one hour**” MM1B.*

## 5.7.2 Ineffective Change Management Initiatives – Negative Affective Outcome

### Lack of Communication – Negative Affective Outcome

Employees pointed out a lack of adequate communication during the implementation process. Information on the rollout was not passed down from top management to the end-users of the systems. Consequently, employees did not understand the benefit and need for the change.

*“So there was not a clear communication as to why there was a need for a new system” MM2A.*

Additionally, they were not regularly updated on the implementation timelines, leaving them in a state of anguish in anticipation for the future.

*“We were told we were going to implement it in August 2012, now we are in August 2012 and we have heard nothing. I do not know anything about it. They are going to go live at some stage, we have been in a frenzy, hoping that it won't be implemented and we won't have to use it” EU2A.*

Employees further stressed that executive management should have been more open and sincere with them regarding the limitations and challenges of the enterprise solutions, as opposed to letting end-users uncover the realities while using the system and letting them suffer in silence.

*“If they communicate what is going to happen and as soon as something goes wrong, **communicate immediately** and don't wait and **do not let us suffer in silence** and only afterwards act. **Communication was not adequate**. When something is going wrong, to say the system is slow, they **do not necessarily communicate from top down**” EU3B.*

### Sub-optimal Training – Negative Affective Outcome

Employees could not associate any derived benefits from the training and barely had an understanding of the solution after the initial training sessions. The training was perceived as an inadequate, manual and unstructured exercise of 'click and paste'. Employees felt the exercise did not provide any direction and explanation of the required actions.

*“People just **clicked through the whole system** and it **added zero value**. People did **not understand anything** after the training” SU2A.*

The training documentations were not deemed useful, relevant or accurate. The materials did not accurately reflect the data on the system, leaving the employees with barely any system understanding on how to work on the actual system.

*“And the **training material does not reflect** what you **actually need to do** on the **system**. They **waste so much time** ... sometimes **the training materials need to be specific for you to understand the system**” EU2B.*

To worsen the situation, the actual enterprise system that was deployed was not synchronised with the training system that had been previously provided. Employees could

not refer to the training materials to help them understand how to correctly use the system to complete their assigned tasks.

*“The training that was given did not talk to the system ... after you did the training, you still did not know what to do here in the system in order to do your work” EU2A.*

The fact that the training examples used were not adequately customised to reflect the different regional work practices signified that not everyone could relate to the system, contributing to the negative perception of the system.

*“The training was not helpful at all, it was a waste of our time. The examples they used were from Jo’burg ... They work in a different way to us. It would be nice to have our terminologies with examples customised to how we work” EU1A.*

Moreover, the fact that in-house trainers could not respond to many of the questions posed by employees made the latter disinterested in the training. In addition, the numerous system issues uncovered during the training left them exasperated as they felt they had been used as test subjects. Consequently, participants who had previously attended the training session felt that they did not benefit and this perception rippled across the organisation, leading to a negative predisposition towards the value of the training.

*“People doing the training could not really give answers. There already you had an attitude where even if you go to training, you know it is not really going to help so the interest in this whole implementation was lost and the guys were not really ready for the new SAP” EU3B.*

*“... But I didn’t go on the 3rd day. I said I am not going; the training was a waste of our time because literally we were treated like monkeys” EU1A.*

### 5.7.3 Coercive Management – Negative Affective Outcome

Participants stated that they had been forced to use premature enterprise solutions that did not provide any resulting immediate benefits for them. Management’s decision to force them to use a sub-standard enterprise solution exasperated the employees who were convinced that the system would not help them to achieve their outputs more efficiently.

*“Well, first of all, we have been forced to use the system. It is not adding any value” EU1A.*

*“Well if the company is forcing me and paying me for it, I have no choice to use the system. But I am not ok with it. It will surely affect my productivity if I am forced to use it” EU2A.*

The fact that executive management did not show any consideration towards employees’ needs and forced employees to use a solution that had been designed to address strategic

needs made the latter unhappy, demotivated and frustrated, for they did not associate any direct benefits to the enterprise solution.

*“The system is not fulfilling **the role that your typical end-user would necessarily identify with**. It is a management [agenda] ... the end-user is **forced to use it** to achieve an output that management essentially wants”* SU2A.

*“The people were **very negative** with being **forced to use** the SAP solution. This was very **frustrating for the employees**”* MM1B.

## 5.8 Causal Relationships Leading to Poor Implementation Strategy

As illustrated in Figure 5-4, weak leadership and pre-organisational constraints are the causal conditions leading to a poor implementation strategy.

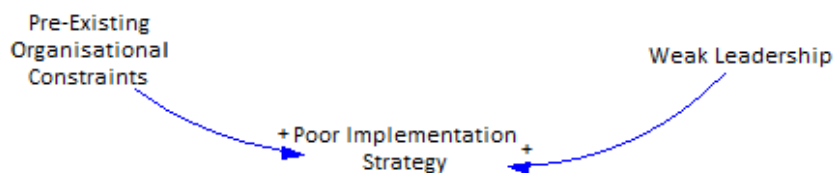


Figure 5-4: Causal Conditions Leading to a Poor Implementation Strategy

### 5.8.1 Weak Leadership – Poor Implementation Strategy

#### Lack of Clear and Shared Vision – Poor Implementation Strategy

Employees attributed the rushed and poorly planned and executed implementation process to an unclear vision.

*“We were just told we were going over to SAP, we are re-implementing the system, **the vision was unclear, there was no planning**”* SU4B.

The ERP implementation was led by the CFO who had recently joined the organisation. Without carefully understanding and analysing the environment and consulting key stakeholders, he proceeded with a rushed SAP vanilla implementation approach. Employees criticised the chosen implementation approach as they felt that a more careful methodical implementation approach was required for such a large and decentralised organisation.

*“The issue was probably where the CFO came from and the mind-set of a small organisation to a major organisation. ... In a large organisation, **you cannot just buy a software and implement it without carefully planning the change and assessing the environment**. It was a **short-sighted vision** on the part of senior management ...”* SU4B.

## 5.8.2 Pre-Existing organisational Constraints – Poor Implementation Strategy

### Existing Financial Crisis – Poor Implementation Strategy

The enterprise system implementation was seen as a way for sourcing external funding from external stakeholders in order to alleviate the financial difficulties faced by the organisation. The financial constraints of the organisation led to strict and unrealistic implementation timelines; a rushed implementation process followed suit without attributing any importance to the planning phase.

*“The timelines were completely squashed and [the organisation] had to do it that way because we were pressed hard in order for us to reflect the cost or the finances in the company” MM1B.*

## 5.9 Causal Conditions Leading to Coercive Management

As illustrated in Figure 5-5, poor implementation strategy and resistance to change have a significant causal effect on the type of management in place.

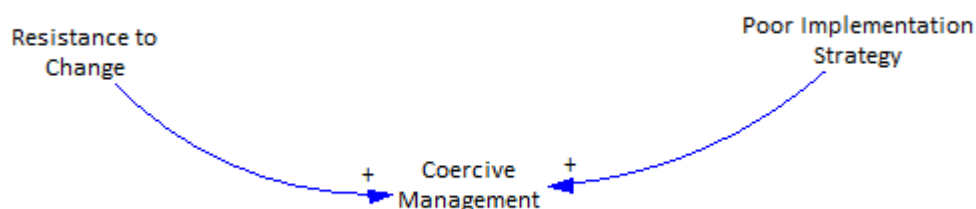


Figure 5-5: Causal Conditions Leading to Coercive Management

### 5.9.1 Poor implementation strategy – Coercive Management

#### Cost Constraints – Coercive Management

Participants claimed that in an attempt to justify the budgeted cost spent on ERP systems and in order to avoid classifying the implementation as a failure, executive management compelled employees to use sub-standard systems.

*“The reason for forcing people to use systems is that a lot of money has been spent on the solution ... it will be a flop project if people do not use it” MM1A.*

*“Money was spent with the B2B project, and the PPM implementation, so with the money that was spent on new systems, it had to be used” SU3B.*

#### Rushed Implementation Strategy – Coercive Management

In order to comply with the strict implementation deadlines set out, the ERP solution was forced upon the users.

*“Executive management just forced the solution down to the business and forced us to use it to adhere to the unrealistic project timelines set” MM1A.*

An organisational-wide training was launched just a few days before the actual ‘Go-Live’ date. Employees were compelled to attend the training sessions and were still being trained during and after the rollout date. In order to meet the set training deadlines, training was provided on an incomplete system whereby many of the features were either incorrect or omitted.

*“The SAP implementation is going on at the same time [of the training], there was this whole rush because we are changing our systems, so from top management it was like by this date we should all have been using SAP. This is why training was forced” EU1A.*

### 5.9.2 Resistance to Change – Coercive Management

As seen from executive management’s point of view, employees’ lack of readiness to change led to the former resorting to the use of coercive pressure. Employees provided some insight into this behaviour, citing that they would only use the enterprise systems when forced by executive management.

*“There are many people who won’t use the solution it at all unless they are forced to” MM1A.*

*“Management has to force use because of the resistance of the utilisation of the system ...” SU3B.*

## 5.10 Causal Relationships Leading to ERP Solution Inadequacies

Causal conditions leading to ERP solution inadequacies relate to inadequate user involvement, inadequate user requirement and poor implementation strategy, as depicted in Figure 5-6. These relationships are described in the subsequent sections.

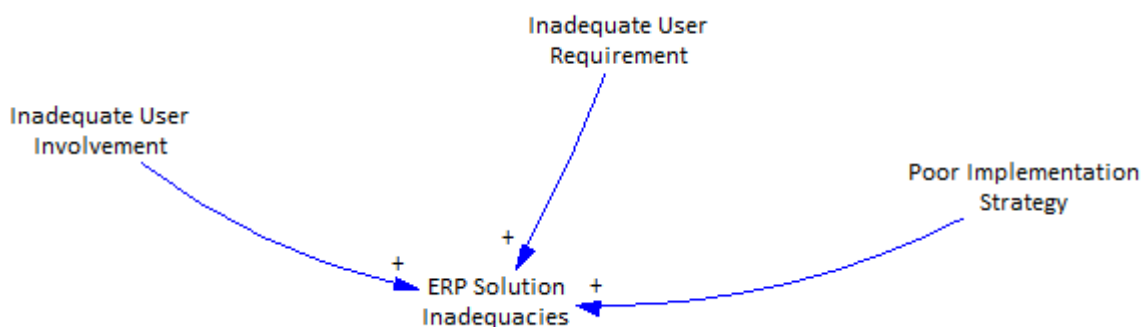


Figure 5-6: Causal Conditions Leading to ERP solution Inadequacies



### 5.10.1 Inadequate User Involvement – ERP Solution Inadequacies

#### Inadequate User Involvement – Lack of core functionality

Employees discussed the impact of inadequate user involvement on core functionality. The low involvement of users during the implementation signified that employees did not have the authority to influence the design of the ERP solution to cater for their needs.

*“PPM was a different case. Some tools **we have no control over** ... we cannot **influence the functionalities to cater for our needs**, we cannot ask the relevant questions. By the time it got to us, **it was at implementation**, it was not at development and testing” MM2A.*

*“But now because **they did not consult the end-users who will use the system**, and just implemented the systems. Some of the **functionalities did not work like we would need it to do certain things** ...” EU2B.*

#### Inadequate User Involvement – Data Errors

Employees linked the wrong data migration to the limited user involvement. They explained that the data on the new ERP solution did not provide an accurate reflection of the business.

*“... **because there was so few user involvement, they converted the data wrongly**...When they did the conversion, they converted it into a different format as to what was initially communicated, they converted it incorrectly” MM2B.*

The fact that employees were not involved during the initial implementation phases implied that data errors could not be picked up prior to the migration, most of which were only picked up after the ‘Go-Live’ date.

*“It would have been easier **if users were involved**, they **would have picked up the data errors upfront** as opposed to them **learning while using the system**” MM1B.*

### 5.10.2 Inadequate User Requirement – ERP Solution Inadequacies

Users’ requirements were not met in terms of the functionality and customisation of the enterprise solution. User requirements were not documented. Consequently, critical functionalities which were part of their legacy systems were not implemented, limiting the users’ ability to perform critical functions.

*“What you could get from the prior solutions is not retrievable in the **SAP system**. And it comes down to the **user requirements**, were **user requirements** given, has it been modelled in the system and has it been tested” SU4B.*

Core requirements were not incorporated in the ERP solution. The enterprise solution implemented did not meet users’ functional requirement. In effect, when SAP PPM and cProjects were initially implemented, employees found that none of their core requirements were catered for in the enterprise solution. The fact that requirements from the different

business units were not sought and documented led to an incomplete and inaccurate representation of the functional needs resulting in an inadequate ERP solution.

*“I would say that for the two new modules, SAP PPM and cProjects, **all the requirements that we wanted from the system**, the system at the moment cannot cater for those requirements. And basically, this is because **the user requirements upfront were not completely documented** in terms of what the users were expecting from the system” MM1B.*

#### 5.10.3 Poor Implementation Strategy – ERP Solution Inadequacies

Both project resource constraints and poor implementation strategy negatively impacted functionality, integration and customisation of the ERP solution.

##### Cost Constraints - ERP Solution Inadequacies

The fact that the implementation was constrained in terms of budget negatively impacted the implemented ERP solution. Core functionalities and key integration features were not developed due to the financial restraints imposed.

*“My understanding is that there was supposed to be **a project initiation portion to PPM as well which I understand is not being created and will not be looked at with the budget cuts**. ... So people will **continue using [the WFMS]** essentially in the medium term” SU2A.*

Furthermore, executive management took a strong decision to limit all software customisations. In effect, the organisation’s decision to implement a SAP vanilla solution was due to the restrained budget allocated to the implementation project.

*“I think **it would have cost the organisation too much of money to customise the new SAP**” EU2B.*

##### Personnel and Time Constraints – ERP Solution Inadequacies

The negative impact of personnel and time constraints on the anticipated integration functionalities cannot be overlooked. The development of the integration of the ERP solution and the GIS were delayed due to the personnel and time constraints.

*“The hurdle was to get **resources and time** available to perform this **integration** ... because the **resources are constrained, a whole number of changes have been proposed both on SAP and [the GIS solution]**” SU3A.*

##### Poor Implementation Strategy – ERP Solution Inadequacies

Participants reasoned that the rushed implementation strategy negatively impacted the overall solution. The resulting ERP solution was characterised as sub-standard due to the numerous experienced gaps. Moreover, a vanilla approach implied that none of their customisation requests could be met.

*“When it comes to system implementation, **you can never fast track the development. You will end up having lots of gaps, you will end up having***

*an empty skeleton ... which provides nothing but rubbish information at the end of the day. And that is the reality of the thing” SU3B.*

*“When the individual came in, he said we will put down **SAP vanilla**. You will work in SAP vanilla. And we said given the understanding of the business, we cannot, we will have to **do a little bit of remodelling and reconfiguration that was not allowed ...**” SU4B.*

### 5.11 Causal Conditions Leading to a Lack of Shared Knowledge

The causal conditions leading to a lack of shared knowledge are depicted in Figure 5.7. Poor implementation strategy, inadequate user involvement and ineffective change management initiatives lead to a lack of shared knowledge.

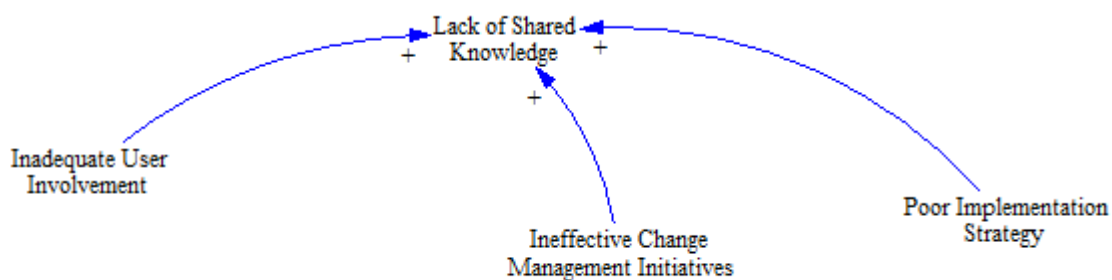


Figure 5-7: Causal Conditions Leading to a Lack of Shared Knowledge

#### 5.11.1 Inadequate User Involvement – Lack of Shared Knowledge

One of the causative factors accounting for a lack of shared knowledge amongst different stakeholders points to the inadequate user involvement during the implementation lifecycle.

The few managerial employees who were part of the implementation activities were not end-users of the system; they did not possess core process knowledge required to translate the functional requirements of the solution to technical requirements.

*“Initially, we **only had one user involved** ... So the user who was a manager did not have **that knowledge** that is required for the functions which the system need to cater” MM1B.*

*“... **You have to involve the end-users** who are the core users on the system who **understand the business and have the required knowledge**. You can’t take a manager who does not even know which button to click ...” SU3B.*

Moreover, the inadequate user involvement as part of the implementation process led to minimal interaction between consultants and end-users who were the purveyor of the organisational process knowledge. Consultants were confronted with the task to extract the knowledge from the former to successfully map and configure organisational processes to

the ERP system. However, due to the limited user involvement, despite their vast knowledge of SAP, consultants failed to acquire the required implicit business knowledge.

*“We should have actually used our people from the start ... we found out in all the trainings that consultants **were not that informed about the way the organisation works**. So the SAP consultants were not completely informed. They knew **how SAP works** and how it is supposed to work but how you physically **need to implement it in the organisation, that was the problem** and there **you needed expert knowledge** which you can only get from employees who have been performing that function over the years”* MM1B.

#### 5.11.2 Poor implementation strategy – Lack of Shared Knowledge

Time, cost and personnel constraints are noted as causal reasons leading to a lack of shared knowledge.

##### Rushed Implementation Strategy - Lack of Shared Knowledge

The whole implementation cycle was rushed to such an extent that external consultants did not have sufficient time to adequately understand the organisational processes and gain any insightful business knowledge.

*“... The organisation decided to use **external consultants**. And **intense knowledge of the business** could not be acquired **quickly** so to get a good **business understanding**. So that’s the first problem”* MM1B.

The fact that the implementation timelines were condensed meant that the consultants were not allocated adequate time to learn about the current processes and practices within the organisation; this would have led to a better understanding of the different core processes and how to implement the best practices that were suited to support the organisation’s core functions. Consultants were not given any leeway time to interact with the end-users, to study and understand the business, in order to draw accurate user requirements.

*“... So the roll out was very **short duration**; so the consultants also they did not have **time to acquire the required process knowledge ... learn about how the business processes work correctly. How the processes work and how the system can be implemented correctly so that it is beneficial**”* MM1B.

##### Time and Personnel Constraints - Lack of Shared Knowledge

Enterprise systems are perceived to run for long durations. On average, an implementation cycle lasts up to five years. Due to the lengthy timeframe of these projects, the probability of having a consistent team for the entire duration of the implementation cycle is relatively low. During the course of an ERP implementation, loss of any key employee or consultant has an adverse impact on the project in terms of knowledge loss and the project momentum.

*“Unfortunately for systems like SAP or something that is massive in terms of roll out, **these projects run from three to five years and the chances of having teams that are there for the duration of five years is low.** The momentum of the whole project disappears with **loss of key people.** We have **experienced the loss of tacit knowledge** for crucial projects” SU3A.*

#### Cost Constraints – Lack of Shared Knowledge

The cost constraints led to the cancellation of numerous activities which ultimately led to a lack of shared knowledge in the organisation.

*“Also, the forecasting managers used to have a meeting twice a month. This has **not happened** in a while because of the **cost initiatives.** This was a **knowledge-sharing platform** and the purpose was to **share ideas and discuss the problems** they were having” MM2A.*

Moreover, external consultants’ contributions were cut short owing to financial constraints. Consultants were equipped with a wealth of technical knowledge that had not been made explicit within the organisation.

*“Due to the **budget constraints,** they will let the consultants go ... **consultants come with so much of knowledge,** this will impact us. We are **not ready to function without them.** I am not quite sure who will be supporting us” SU3B.*

#### 5.11.3 Ineffective Change Management Initiatives – Lack of Shared Knowledge Ineffective Communication – Lack of Shared Knowledge

Communication channels between top management and employees were inadequate, leading to a lack of shared knowledge amongst different stakeholders. Information was not disseminated and employees lacked critical implementation knowledge.

*“My complaint is that ... **there is no communication because they do not share the information on our side and they are supposed to share the knowledge** and say this is what has been happening, the status of the implementation, the need for such an implementation so everyone understands the objectives” SU3B.*

#### Sub-optimal Training – Lack of Shared Knowledge

Both in-house trainers and employees categorised the trainings as ineffective sources of knowledge transfer, leading to a noted SAP knowledge gap. In-house trainers did not gain the required technical knowledge.

*“The only way for **knowledge transfer** is the training that we did for SAP; **the simulation training was not great for me**” EU3A.*

From a technical perspective, in-house trainers were not adequately prepared to conduct the organisational-wide trainings. They were by no means SAP experts, having just learnt SAP themselves, before delivering the training. Consequently, they lacked the required

technical knowledge to conduct the subsequent organisational-wide training. Expectedly, during the end-user training, employees questioned SAP knowledge of in-house trainers.

***“The trainers were not very knowledgeable .... They needed to learn SAP. They are now helping us learn about SAP. I think the trainers did not know the program themselves” EU1A.***

Consequently, employees were subject to numerous uncertainties during the trainings, none of which could not be clarified and solved. The end-user trainings did not equip them with the required SAP knowledge. Employees did not have an adequate knowledge of the complexities of the enterprise solution and could barely deliver the expected outputs.

***“... The first set of training that happened was not very helpful. In that, even if you did the training, you still did not gain much SAP knowledge, we still did not understand how to use the system properly ...” EU2B.***

## 5.12 Causal Relationships Resulting in Ineffective Change Management Initiatives

The causal conditions leading to ineffective change management initiatives stem from coercive management and poor implementation strategy. These are depicted in Figure 5-8.

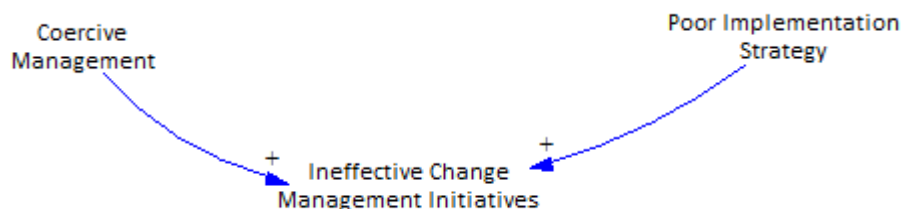


Figure 5-8: Causal Conditions Leading to Ineffective Change Management Initiatives

### 5.12.1 Poor Implementation Strategy – Ineffective Change Management Initiatives

#### Poor Implementation Strategy – Ineffective Change Management Initiatives

The fact the whole implementation was a rushed initiative implied that no effort was put into planning the change. Employees stated that their previous SAP implementation took four years to plan and implement, as opposed to the latest implementation which was rushed, without any consideration given to the change process. There was not adequate time invested in educating and creating awareness of the need for the change and in planning the change.

***“So if I just look at the two different scenarios, one was carefully thought of with proper business involvement and training materials. It took us***

*four years to successfully implement the system ... **2010 was a significantly different approach. We were just told we were going over to SAP ... there was no planning, no proper training ... people did not understand the system, people did not know how to work with the system***" SU4B.

Employees affirmed that executive management did not give any due consideration to the appropriate timing of the implementation activities. The implementation happened towards the end of a fiscal year which was a busy period and these organisational changes added an extra load to their already eventful schedule. Moreover, the organisational-wide training took place in parallel with the rollout, therefore compounding the pressure on the users.

***"Two weeks before the roll out time, they expect you to drop everything. It was at a point where we could not be available because of work pressure. ... The timing where you are just implementing the training two to three days before the roll out. It does not work"*** EU3B.

#### 5.12.2 Coercive Management – Ineffective Change Management Initiatives

The implementation of the enterprise solution was seen as a strategic initiative forced upon users. Employees believed that decisions made at the top were seldom well communicated to the different business units.

*"SAP is basically an **executive decision, imposed on everyone** in the organisation. We should be using SAP; that was very much a blanket decision. **So those we find sometimes are not necessarily communicated** as well, maybe they are communicated broadly but maybe not so much in detail"* MM2A.

The majority of the implementation initiatives were imposed on the users. Near the rollout date, executive management forced the employees to undergo the training. Once the training was completed, employees were forced to use a sub-standard system and they were required to manually fix the errors through use. Support structures, for those latter events, were not well defined to deal with implementation issues. Employees were forced to work additional hours in order to ensure that all the errors were fixed by the set deadline, with executive management's only concern being employees' use of the enterprise solution as per the milestones set.

*"There is **no support**, use of the system **was forced**, it is only expectations that the system needs to be rolling ..."* SU3B.

*"They did not want to go back to fix it, or to do a roll back or to agree that they made a mistake, **they rather forced us to fix the data errors manually** for months after the implementation. This was **a huge change management error** that management did perception-wise"* MM2B.



### 5.13 Causal Relationships Resulting in Inadequate User Involvement

The causal conditions leading to Inadequate user involvement relate to coercive management and negative affective outcome, as depicted in Figure 5-9.

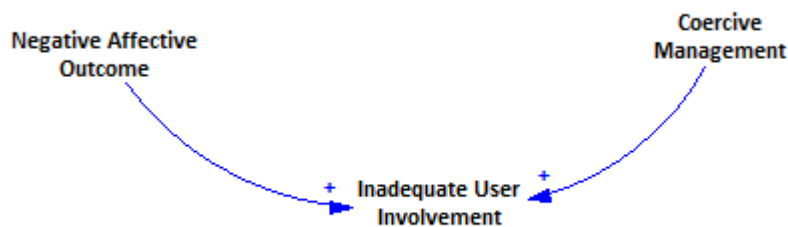


Figure 5-9: Causal Conditions Leading to Inadequate User Involvement

#### 5.13.1 Coercive Management – Inadequate user Involvement

Since the ERP implementation was a top-down driven initiative, end-users' views were barely considered during the implementation lifecycle, leading to a wide gap between executive management and the different business units. Management's sole focus was on implementation of the solution and no importance was attributed to the consultation and involvement of end-users.

*"Now we have **a system that was basically forced on the business, without proper training and without having the influence from the business**" SU4B.*

#### 5.13.2 Negative Affective Outcome – Inadequate user involvement

The fact that management did not involve employees in the initial stages of the implementation lifecycle left employees with a lot of resentment which gave rise to their dis-involvement in the later stages of the implementation.

*"**The morale is down, it is low, they did not consult you when they did the changes so that already impacted on us. ... So yes you feel negative towards the system and do not want to have any part in fixing up the problem. You feel like they can fix their own mess**" EU2B.*

### 5.14 Causal Relationships Resulting in Inadequate User Requirement

Causal conditions leading to inadequate user requirement relate to inadequate user involvement, lack of shared knowledge and poor implementation strategy, as depicted in Figure 5-10. These relationships are described in the subsequent sections.



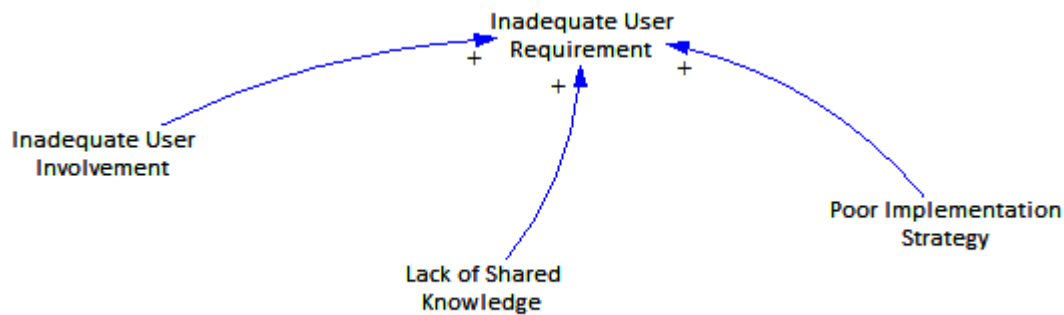


Figure 5-10: Causal Conditions Leading to Inadequate User Requirement

#### 5.14.1 Lack of Shared Knowledge – Inadequate User Requirement

The lack of shared process knowledge amongst different units led to diverging user requirements. Each operating unit had its own customised business process and their individual way of operating; they were unacquainted with the process knowledge of other units. Consequently, getting buy-ins and reaching a consensus from different operating units for an integrated process became a challenging undertaking.

*“The biggest challenge that we have is to **get shared understanding across the table**; what is the common need across the organisation. If you look at something like SAP PPM, because the system is an organisation wide one, you generally have **a lot more stakeholders** and **a lot more difficulty getting agreements** to get the **user requirement inked down ...**” SU3A.*

Another reason for users’ requirements not being met related to consultants’ failure to gather adequate process knowledge to understand the core requirements of the different business units. The lack of comprehensive business knowledge led to incomplete and inaccurate user requirements.

*“You can attribute the fact that **user requirements were not clear** due to the fact that the organisation decided to use **external consultants**. And **intense knowledge of the business could not be acquired** quickly to get a good business understanding. So that’s the first problem” MM1B.*

#### 5.14.2 Inadequate User Involvement – Inadequate User Requirement

Users’ requirements were not met due to the inadequate user involvement. Requirements of the solution were drawn without consulting the end-users.

*“You know the biggest problem with this whole change was the actual **people using the SAP** on a daily basis **were not consulted with the requirements of the new system**” EU2B.*

None of the core functionalities that the end-users desired and required were catered for. In effect, the enterprise solution only catered for executive management’s requirements. There is a noted disconnect between executive management and the different operating units, whereby the former had their own conceptual perception of how the business ought to function in the future, whilst the latter had their own specific requirements.

*“There was **little and no interaction with the OUs [Operating Units]** before they implemented this enterprise solution. **The requirements were not from the users.** It was from the national office because there is a huge disconnect between the national office and the OUs” MM2B.*

Employees felt that consultants ended up implementing what the latter thought was suitable for the business, as opposed to seeking the right user requirements.

*“So [the consultants] just rolled out **what they thought fit and not what the users wanted**” MM2B.*

Moreover, the few users involved as part of the implementation were not part of the targeted user group. Managerial staff may not have a comprehensive understanding of the required functionalities of the operating units as they are not necessarily seen as subject matter experts. Moreover, the situation was aggravated by the fact that the interaction between end-users and the selected managerial representatives of the business units to clarify user requirements was kept to a bare minimum.

*“I think where we missed it was that the **user assigned to the project team was a manager ... the person was not really responsible in terms of the day to day doings of that function, ... so some of the items might have been lost and we also never had any requirements meetings** that would be filtered directly through to her” MM1B.*

#### 5.14.3 Poor Implementation Strategy – Inadequate User Requirement

##### Project Resource Constraints – Inadequate User Requirement

Employees stressed that user requirements were not delivered according to the expectations, due to the time, cost and personnel limitations they usually faced.

*“For the actual solution getting delivered, **a lot of the requirements that are asked for are not provided, they will tell you we don’t have time, we don’t have the budget, it is too difficult to implement**” EU3B.*

Since ERP systems are complex undertakings over relatively long time-spans from the project outset, there is always the risk of delivering a project with flawed user requirements. Requirements may change during the implementation lifecycle, the technological environment may transform or the system may become obsolete, thus impacting the original requirements.

*“The biggest issue is that users face is that if **a project is running over five years, chances are that the user requirements will be invalid and out of date by the time we get to implementation.** And secondly, there will be so much of changes to the environment/system that what you implement will not necessarily be what the needs are at that point in time” SU3A.*

## 5.15 Causal Relationships Resulting in Lack of Middle Management Support

Causal conditions leading to a lack of middle management support relate to ERP solution inadequacies, pre-existing organisational challenges and weak leadership, as reflected in Figure 5-11. These relationships are described in the subsequent sections.

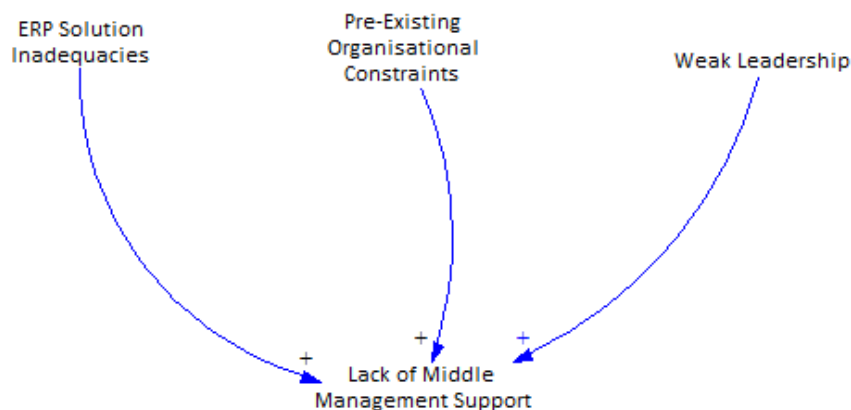


Figure 5-11: Causal Conditions Leading to a Lack of Middle Management Support

### 5.15.1 ERP Solution Inadequacies – Lack of Middle Management Support

One of the main reasons for middle management's lack of support towards the enterprise solution was a consequence of the solution not meeting their expectations, particularly in terms of functionality, integration and technological infrastructure. Initially, managers were enthusiastic about the new solution but, eventually, they lost faith since the ERP solution did not meet their needs and that of their subordinates and they felt unheard by executive management.

*"Initially, managers did have the buy-in for the system, but **middle management did not have the buy-in for the ultimate system** that came on board because **it did not really perform to what was initially negotiated ...**" MM1B.*

*"... we are forced to use **systems prematurely** and **I am very reluctant** to start using it until it's working properly" MM1A.*

Middle management from case A attributed its lack of support to the use of multiple systems and the lack of integration functionality between its GIS solution and the enterprise solution. The lack of integration implied that project information would have to be duplicated at least three times in three different stand-alone applications.

*"**We are supposed to be using SAP PPM**, we are not ... **we have decided not to load the projects under PPM**. The main problem is the duplication of data. **We have multiple systems where the same data is entered**. We*

*already have the data in a home-made access database, then we have got another GIS system” MM1A.*

#### 5.15.2 Weak Leadership – Lack of Middle Management Support

Middle managers play a particularly important role in implementing change. They not only serve to ensure that policies are implemented at a lower level, but also ensure that the vision is disseminated and defined into concrete objectives and act as leaders in such large-scale projects. However, when middle management does not trust or relate to executive management’s vision, the former will not support the initiative.

*“We are often faced with **strategies and objectives from executive management** which **we question** ... then **I try to avoid them as long as I can**” MM1A.*

*“We were excited about the system initially .... Now, I have completely **lost my trust in executive management’s vision** .... I don’t believe what they say” MM2B.*

#### 5.15.3 Pre-Existing Organisational Constraints – Lack of Middle Management Support Staff Shortage – Lack of Middle Management Support

Middle management from the forecasting unit did not support the initiative and showed strong opposition to the new ERP solution reasoning that they lacked the manpower required for use of the enterprise solution.

*“We are supposed to be using SAP PPM, we have not, because of our **staff shortage** ...”MM1A.*

### 5.16 Derived Propositions and Theoretical Elaboration

The subsequent sections accentuate the key relationships as depicted in Figure 5-1 through the use of propositions. Propositions focusing on the impact of organisational constraints on the implementation process are first discussed, followed by the impact of a poor implementation strategy. The remaining propositions have been derived through feedback loops. It should be noted that there are no feedback loops involving the organisational and project challenges. Rather, these particular implementation challenges can be regarded as root causes of the ensuing implementation challenges.

#### 5.16.1 Impact of Organisational Challenges

Both weak leadership and pre-existing organisational constraints lead to a poor implementation strategy and a lack of middle management support. Pre-existing organisational constraints also lead to a resistant behaviour. These relationships are reflected in Figure 5-12.

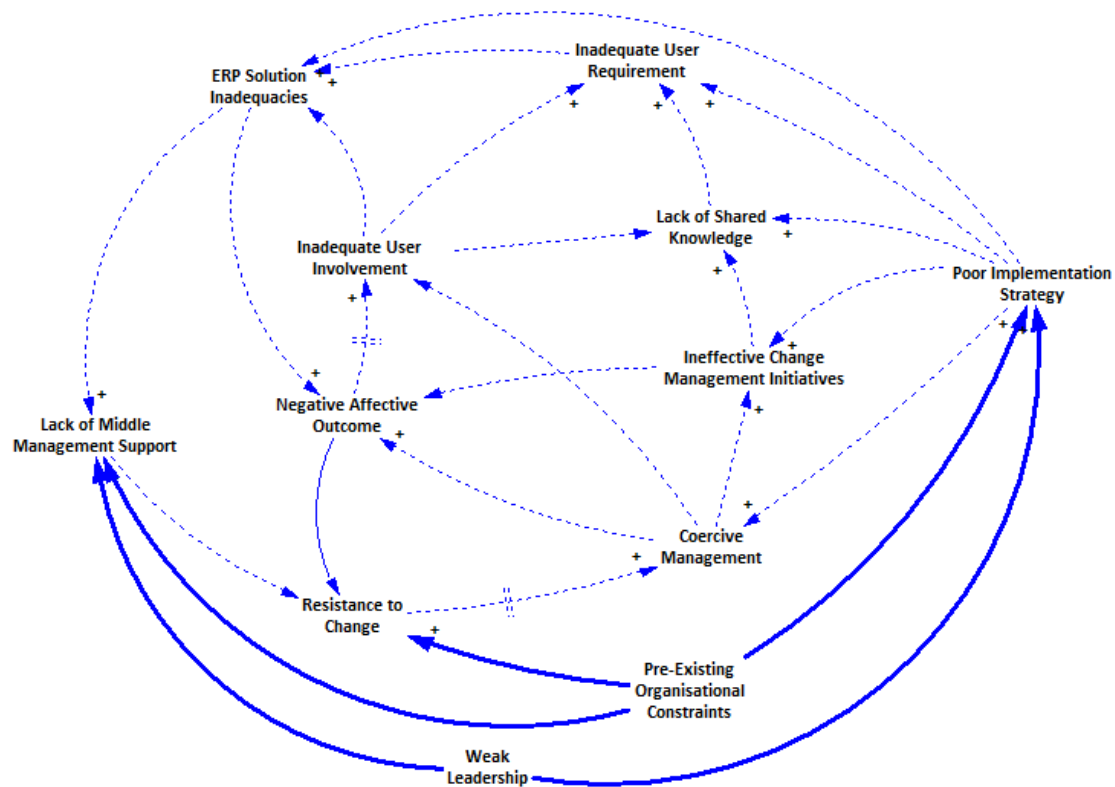


Figure 5-12: Impact of Pre-Existing Organisational Constraints and Weak Leadership

#### Impact of Pre-Existing Organisational Constraints on Poor Implementation Strategy

The implementation of the ERP solution was seen as the panacea for the severe financial crisis faced by the organisation. The organisation opted for a rushed implementation in an attempt to minimise implementation costs, due to existing financial constraints. Consequently, the project team was given unrealistic timelines and a restrained implementation budget.

*5A-1. When an organisation faces existing organisational constraints and yet chooses to undertake a large-scale ERP implementation, the project will be plagued by a poor implementation strategy.*

This proposition is corroborated to some extent by the implementation literature. While Wong et al. (2005) establish that project cost constraints lead to a rushed implementation strategy, Beer and Eisenstat (2000) and Latif, Gohar, Hussain and Kashif (2012) have noted the negative impact of siloed business units and the poor understanding of organisational culture on the implementation strategy (Beer & Eisenstat, 2000; Latif et al., 2012).

#### Impact of Weak Leadership on Poor Implementation Strategy

The leadership team failed to understand the impact of such a large-scale implementation. Arguably, the decision to opt for a rushed implementation can be perceived as a flawed strategic decision.

*5A-2. When weak leadership prevails in an organisation and yet the organisation undertakes a large-scale ERP implementation, the project will be plagued by a poor implementation strategy.*

Weak leadership has been identified as a key barrier to effective implementation of strategy (Beer & Eisenstat, 2000; Jooste & Fourie, 2009; Mapetere & Mhonde, 2012; Rajasekar & Khoud, 2014). Mapetere and Mhonde (2012) additionally affirm that current literature offers little attention to the relationship between leadership and the implementation process. Their research revealed the necessity for implementation leaders to exhibit key leadership competencies as a key requirement for a sustainable implementation strategy (Jooste & Fourie, 2009; Mapetere & Mhonde, 2012).

#### Impact of Pre-Existing Organisational constraints and Weak Leadership on Lack of Middle Management Support

The lack of clear and shared vision and mistrust in top management's strategies led to the lack of support amongst middle-level management. Middle management from the forecasting unit categorically stated that they lacked the manpower required to migrate to the new ERP solution.

*5A-3. When weak leadership and pre-existing organisation challenges prevail in an organisation and yet the organisation undertakes a large-scale ERP implementation without seeking middle management's buy-in, middle management will deploy different tactics to express their lack of support.*

The literature acknowledges the role of organisational constraints as impediments to the support and commitment of middle management in large-scale implementation projects (Balogun, 2003; Sommer, 2011). Public sector implementations are commonly characterised by a weak leadership, and middle management is more likely to devise different tactics to delay the change (Sommer, 2011). In order to minimise the risk of middle management's lack of support, executive management should ensure that middle management share their vision. Executive management should also maintain a good relationship with middle management, whilst ensuring adequate change management initiatives such as communication and ongoing engagement, to understand the prevailing implementation issues at the operational levels (Kuyvenhoven & Buss, 2011; Sommer, 2011).

#### Impact of Pre-Existing Organisational Constraints on Resistance to Change

The lack of uniform practices and weak organisational culture implied that the different business units operated as silos with their own set of beliefs and practices.

*5A-4. When a weak organisational culture prevails due to the lack of uniform practices and yet an organisation chooses to undertake a large-scale ERP implementation, employees will exhibit resistant behaviour.*

In the presence of a weak organisational culture, individual culture predominates. Consequently, employees have different perceptions and beliefs of how the organisations ought to operate. This is exemplified in large organisations where individual units operate in silos. The individual units often have different operational ways of functioning and their own individual culture might be divergent from the overall corporate culture. Cultural diversity adds another level of complexity as cutting across the diverse cultural barriers of organisations is seen as a significant obstacle to success (Ke & Wei, 2008). When organisations are unable to integrate the diverse cultures into one common ethos, resistant

behaviour and the probability of implementation failures become higher (Gargeya & Brady, 2005; Ke & Wei, 2008).

### 5.16.2 Impact of Poor Implementation Strategy

A poor implementation strategy negatively influences the change management initiatives, user requirements and the overall ERP solution. Poor implementation strategy also contributes to a lack of shared knowledge in the organisation. These relationships are highlighted in Figure 5-13.

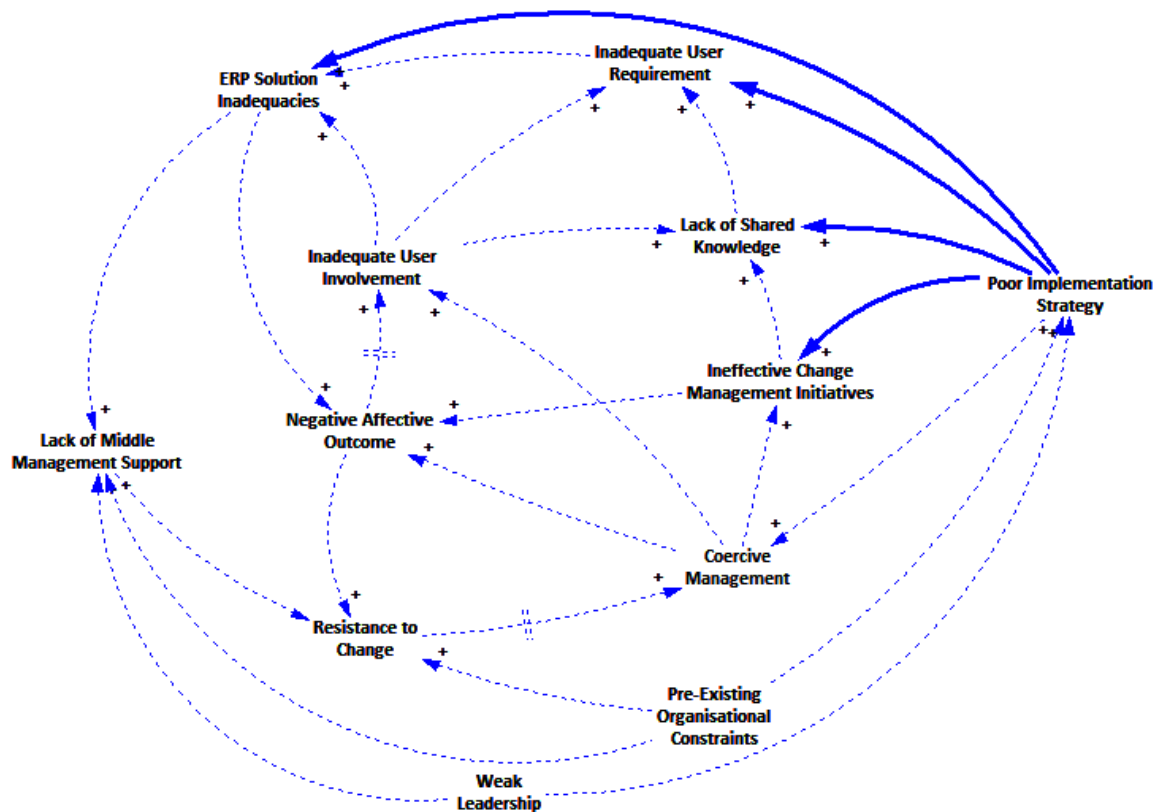


Figure 5-13: Impact of Poor Implementation Strategy

#### Impact of Poor Implementation Strategy on Ineffective Change Management Initiatives

In an attempt to meet the pre-set schedules and budget, critical change management activities were overlooked. Time allocation to core exercises, such as training, educating and creating awareness on the need for the change, planning the change or setting up formal communication channels were disregarded.

*5B-1. When an ERP implementation is plagued by a poor implementation strategy, the project team will more likely deploy ineffective change management strategies.*

The adverse relationship of poor implementation strategy on change initiatives has been corroborated by the literature. Allocation of sufficient resources and adequate planning for change-related activities are often compromised in an attempt to control implementation budgets (Davenport et al., 2004; Kumar et al., 2003; Umble et al., 2003; Wong et al., 2005).



### Impact of Poor Implementation Strategy on a Lack of Shared Knowledge

The restrained timelines impacted effective knowledge-sharing and transfer mechanisms, such that consultants could not acquire the required process knowledge and in-house employees could not acquire the required technical knowledge necessary to use and support the ERP solution. Cost constraints negatively impacted knowledge-sharing strategies while the loss of key project personnel led to a loss of tacit knowledge.

*5B-2. When an ERP implementation is plagued by a poor implementation strategy, the project team will more likely deploy ineffective knowledge management mechanisms, leading to a lack of shared knowledge amongst different stakeholders.*

The adverse relationship of personnel constraints on knowledge has been corroborated to a certain extent by the literature (Garg, 2010; Kumar et al., 2003).

### Impact of Poor Implementation Strategy on Inadequate User Requirement

Consultants did not have the time to understand and seek core-user requirements and this led to inadequate requirements.

*5B-3. When an ERP implementation is plagued by a poor implementation strategy, the project team will place less emphasis on drawing adequate user requirements.*

This proposition is validated by the literature. Unrealistic timelines often account for inaccurate and incomplete requirements. Moreover, organisations often fail to validate requirements due to the project cost constraints (Firesmith, 2007; Kalinowski et al., 2015).

### Impact of Poor Implementation Strategy on ERP Solution Inadequacies

A poor implementation strategy negatively impacts the functionality, integration and customisation scope of the solution. Use of a SAP vanilla approach implied that all customisation requests were declined. Moreover, the ERP solution was scaled down substantially due to project resource constraints, leading to the absence of core functionalities.

*5B-4. When an ERP implementation is plagued by a poor implementation strategy, the scope of the proposed scope of the ERP solution will be compromised, resulting in an inadequate ERP solution.*

These findings are partially corroborated by the literature. Implementing a SAP vanilla solution to limit customisation requests is a common strategy used by organisations (Chen et al., 2009; Davenport, 1998; Soh et al., 2000).

### 5.16.3 Feedback Loops Depicting the Dynamic Interplay of ERP Implementation Variables

The feedback loops are a useful way to observe and understand the behaviour of complex systems (Sterman, 1994). In this section, feedback loops have been used to depict the dynamic interplay between the identified ERP implementation challenges.



### Feedback Loop One

Figure 5-14 illustrates the dynamic interplay between negative affective outcome, resistance to change and coercive management.

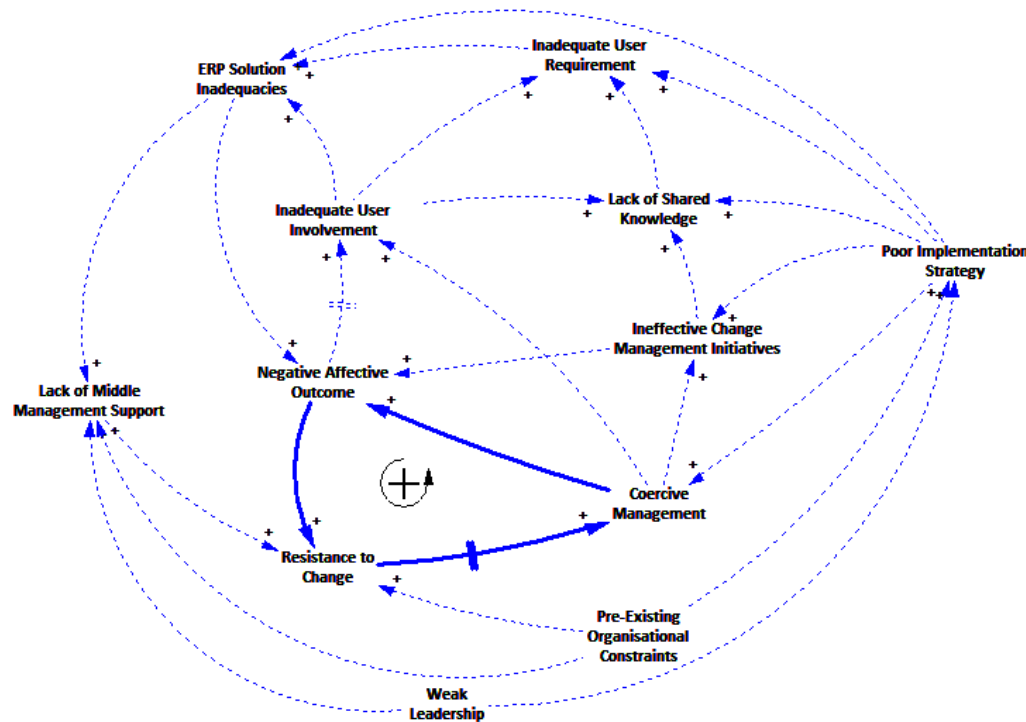


Figure 5-14: Dynamic Interplay between Negative Affective Outcome, Resistance to Change and Coercive Management

This is a reinforcing loop implying that an increase in any of the variables will have an amplifying effect on the remaining variables. An increase in the negative affective outcome noted amongst employees will amplify their resistant behaviour towards the change. Management will resort to a higher level of coercive pressure, further intensifying the negative affective outcome of employees which, in turn, amplifies the resistant behaviour. This loop can be seen as a resulting implementation outcome which is triggered by different conditions. Two propositions are derived from this loop.

- 5C-1. *Employees exhibiting negative affective outcome towards an implemented ERP solution will be more averse to the change and will depict resistant behaviour.*

Negative affective outcome encompasses a lack of perceived change benefit and value and low employee morale. Numerous studies have validated the relationship between perceived benefit and value and resistance to change. A lack of perceived change benefit and value enhances resistant behaviour, therefore inhibiting the use of the enterprise solution (Kim & Kankanhalli, 2009; Kwahk & Lee, 2008). Kim and Kankanhalli (2009, p.572), further, borrow from the status quo bias theory put forth by Samuelson and Zeckhauser (1988) and assert

that if “the perceived value of the change is low, users are likely to have greater resistance to change”, therefore, lending support to the proposition.

*5C-2. When management resorts to use of coercive measures to overcome resistance to the ERP solution, the negative affective outcome will intensify, and greater negative affective outcome will amplify resistant behaviour.*

The resistant behaviour, inhibiting the use of the ERP solution, effectively increases the use of coercive measures as a means to force usage. As employees’ resistance increases, the pressure from management increases accordingly. This relationship is represented as a delay in the causal loop because management’s decision to employ coercive actions is only put into effect after assessment of the acceptance of the solution by concerned parties. However, use of coercive measures will further intensify the negative affective outcome of employees. The strong correlation between coercive management and negative affective outcome was explained in section 5.7.3. Management’s decision of forcing employees to use a sub-standard enterprise solution resulted in employees’ exasperation, since the latter were convinced that use of the ERP solution had no resulting benefit.

The use of coercion to force usage of an IT solution has been validated by Rivard and Lapointe (2012) in their study on changes in end-users’ resistant behaviour in response to the different behaviour of ERP system implementers. In the context of their study, ERP system implementers were referred to either top or middle management or IT personnel. Coercive measures may include either explicit or implicit threats used by ERP system implementers to ensure end-users’ compliance (Rivard & Lapointe, 2012). While the main motive of coercive pressure is to ensure end-users’ compliance to usage, in effect, only coercive measures perceived to be credible decrease the resistance level (D. Allen et al., 2000; Rivard & Lapointe, 2012; Yukl & Tracey, 1992). In cases, where end-users perceive the threats to be unjustified, user resistance will intensify while decreasing the level of trust between key stakeholders (D. Allen et al., 2000; Rivard & Lapointe, 2012).

### Feedback Loop Two

Figure 5-15 emphasises the dynamic interplay between coercive management, ineffective change management initiatives, negative affective outcome and resistance to change.

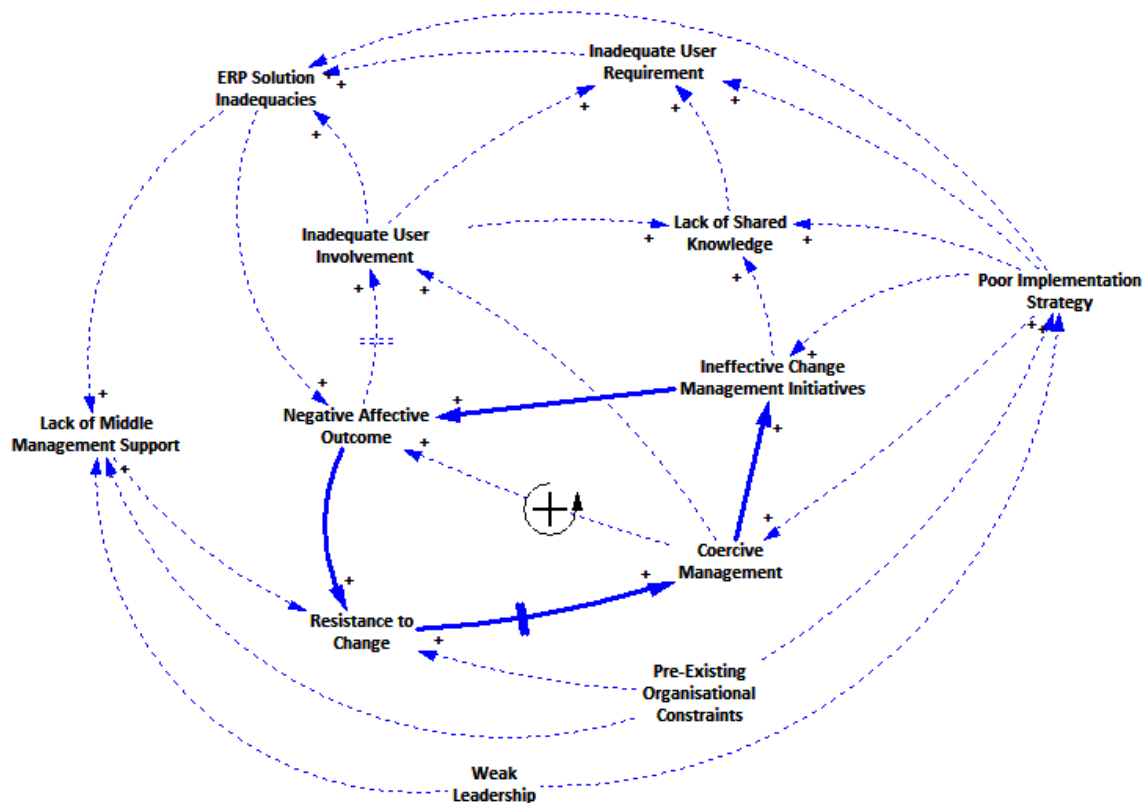


Figure 5-15: Dynamic Interplay between Ineffective Change Management, Negative Affective Outcome, Resistance to Change and Coercive Management

This loop is also a reinforcing one. Coercive management leads to ineffective change management initiatives, which results in a negative affective outcome, leading to resistance to change. The resistant behaviour amplifies the coercive pressure as discussed in the earlier section. The following proposition is derived.

- 5D. When end-users perceive change management initiatives as ineffective, they will more likely exhibit a negative affective outcome, amplifying resistant behaviour.

The findings of this study depict the negative impact of inadequate communication, sub-optimal training on perceived change benefit and value and employee morale. These findings are corroborated by the literature (DonHee, Lee, & Olson, 2010; Keong et al., 2012; Wong et al., 2005).

### Feedback Loop Three

The third loop, highlighted in Figure 5-16, shows the relationship between inadequate user involvement, inadequate user requirement, ERP solution inadequacies and negative affective outcome. This loop is also seen as a reinforcing one.

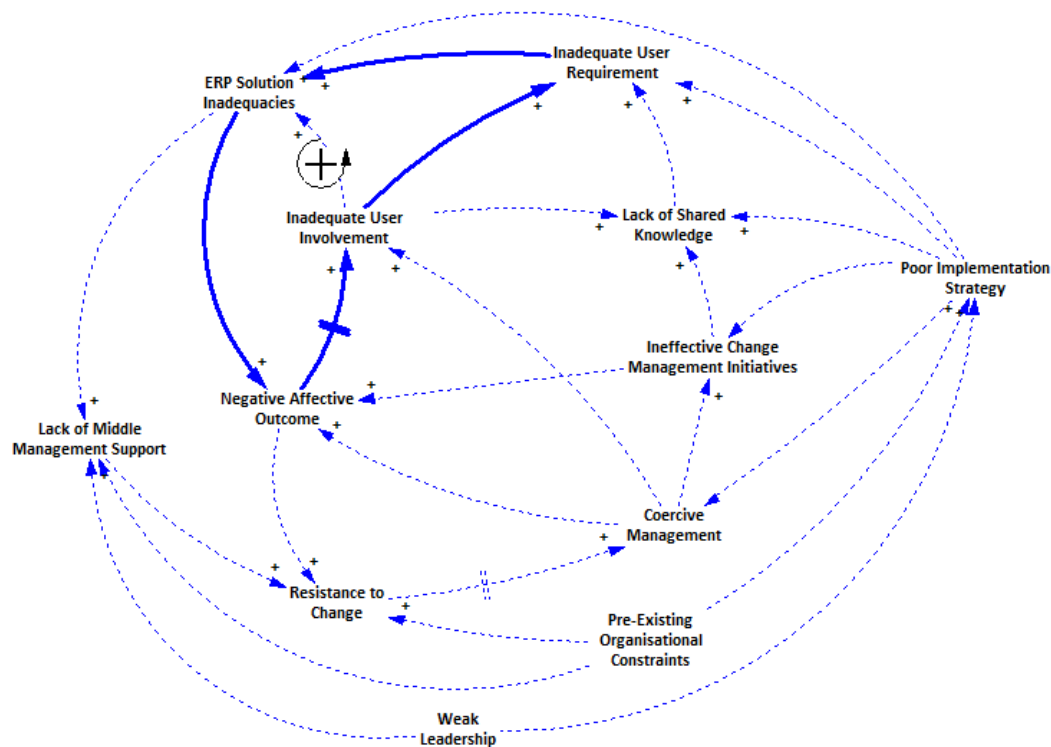


Figure 5-16: Dynamic Interplay between Inadequate User Involvement, Inadequate User Requirement and ERP Solution Inadequacies

Inadequate user involvement during the ERP implementation increases the likelihood of inaccurate and incomplete user requirements. Inaccurate and incomplete user requirements will negatively impact the ERP solution. The higher the perceived inadequacy of the ERP solution, the higher the negative affective outcome exhibited by end-users will be. The negative affective outcome further dampens user involvement. The following propositions are derived from this loop.

- 5E-1. *Inadequate user involvement during the different stages of an ERP solution will give rise to inaccurate and incomplete user requirements which, in turn, will negatively impact the implemented ERP solution.*

The relationship between inadequate user involvement and user requirement has been validated by numerous IS research. Through their study, Wilson, Bekker, Johnson and Johnson (1997) stress that employees are usually keen to participate in the initial consultation stages of an IS solution in order to influence the final outcome of the solution. However, organisations often ignore user input and end up making various wrong assumptions while drawing the user requirements (Ives & Olson, 1984). The findings of Kujala (2003) reveal that participation of end-users in the early implementation stages leads to a more accurate understanding of the user requirements. Moreover, Franz and Robey (1986) highlight the importance of having adequate user representation from all spheres of the organisation, particularly in the context of decentralised organisations, while Wilson et al. (1997) stress the involvement of knowledgeable users to ensure the accuracy of user requirements.

*5E-2. When an ERP solution is perceived as inadequate due to incomplete and inaccurate user requirements, employees will exhibit a negative affective outcome.*

In the context of this research, the enterprise solution did not meet users' expectations, was perceived as incompatible with their needs and subsequently categorised as a misfit. The ERP solution was perceived as inadequate in terms of core functionality, integration and accessibility, and customisation. Moreover, the ERP solution was perceived as complex, rigid and unreliable. End-users' experience with the ERP solution, ultimately, resulted in a lack of perceived change benefit and value, and low employee morale arising from their initial poor user experience and dissatisfaction experienced.

The literature provides some evidence on the relationship between inadequate user requirement and ERP solution inadequacies. Inadequate user requirement is seen as one of the leading causes accounting for the wrong selection and customisation of an ERP solution, inherently leading to a mismatch between chosen product and the business processes of the organisation (Berchet & Habchi, 2005; Garg, 2010; Wong et al., 2005).

Moreover, the relationship between inadequacies of an ERP solution and the lack of perceived change benefit and value and is also corroborated by the literature. Heeks (2010) accentuates the association between the gaps of an ERP solution and its lack of perceived usefulness, whereas Sun, Bhattacharjee, & Ma (2009) acknowledge that perceived compatibility of an IT solution to support employees with their organisational needs is directly related to perceived usefulness. Additionally, technological characteristics such as accessibility, reliability, ease of use and flexibility are known to have a direct impact on the perceived usefulness of an ERP solution (Al-Mamary, Shamsuddin, & Aziati, 2014; Delone & Mclean, 2014; Fan & Fang, 2006). The relationship between poor user experience and lack of perceived usefulness of an ERP solution is acknowledged by (Al-Mamary et al., 2014). On the other hand, very few studies have validated the relationship between ERP solution inadequacies and low employee morale. Kumar et al. (2003) offer some support for the authentication of this relationship. Through their study, Seymour & Roode (2008) reveal that limitations of an ERP solution in terms of integration and functionality negatively impact employee morale.

*5E-3. A negative affective outcome will lead to employees' aversion to participate in any subsequent enhancements of the ERP solution.*

This proposition was formulated following the evidence of the delayed reaction as depicted in Figure 5-16. Employees' negative outlook of the solution signifies that they will more likely be unwilling to commit to any subsequent activities required to address the identified issues of the ERP solution, thus closing the loop. This relationship is represented as a delay in the causal loop to denote the outcome of a negative affective outcome on user involvement.

Support for this relationship is provided by Amoako-Gyampah (2007), who establishes user involvement to be positively correlated to user's attitude towards the system. A lack of



The implementation literature does not provide any evidence with regard to the relationship between coercive management, ineffective change management initiatives and inadequate user involvement. However, the literature categorises coercive management as a 'hard influencing tactic' whereas change management as a 'soft influencing tactic'. Organisations can choose to use either one of these tactics to influence or change the behaviour of their employees (Yukl & Tracey, 1992). Based on this particular argument and the empirical findings discussed in sections 5.12.2 and 5.13.1, a proposition, that the use of coercive power will most likely lead to a lack of importance on change management and user involvement, can be drawn. These sets of relationships, therefore, add to the existing body of knowledge on ERP implementation.

*5F-2. Ineffective change management initiatives and low user involvement result in a lack of shared knowledge amongst different stakeholders which, in turn, will result in incomplete and inaccurate user requirements.*

Inadequate user involvement during the implementation and ineffective change management initiatives subsequently lead to a lack of shared knowledge amongst different stakeholders. In turn, the lack of shared knowledge results in inadequate user requirements.

The relationship between user involvement and shared knowledge has been previously validated by Kumar et al. (2003) who noted a knowledge gap, due to the lack of interaction between implementers of the ERP solution and end-users, as a significant ERP implementation challenge. Prior literature has also acknowledged the use of effective communication to enable a knowledge-sharing culture (Davenport & Prusak, 1998). One way communication and strict top-down communication are seen as knowledge barriers (Riege, 2005). The relationship between a lack of shared knowledge and inadequate user requirement is validated by Kumar et al. (2003) who acknowledge that meeting user requirement is a challenge when the consultants fail to understand users' needs, despite exhibiting good technical knowledge.

*5F-3. When an ERP solution is perceived as inadequate, middle management will more likely not support the initiative, thereby stimulating a resistant behaviour throughout the lower echelons.*

This study reveals that a lack of middle management support stems from perceived inadequacies of the ERP solution. The implemented SAP vanilla solution lacked core functionalities and integration capabilities. Middle management from the forecasting unit showed their disapproval against the solution by exhibiting a strong resistant behaviour. Employees' cognisance of the lack of middle management support towards the change fuelled a generally resistant behaviour.

The literature acknowledges that a lack of middle management support can trigger resistant behaviour during an implementation (Balogun, 2003; Garg, 2010; Sommer, 2011). In effect, a lack of middle management support is attributed as one of the reasons accounting for ERP implementation failures (Garg, 2010; Sommer, 2011).

While prior literature supports the relationship between organisational constraints and a lack of middle management support, as discussed in section 5.16.1, the relationship between ERP solution limitations and lack of middle management support has not been validated. The findings of this study, however, attribute ERP solution inadequacies as one of the root causes of a lack of middle management support, therefore adding to the body of knowledge on ERP implementation.

*5F-4. When employees exhibit resistant behaviour, executive management will more likely use coercive pressure to force usage of the ERP solution.*

The resistant behaviour inhibiting the use of the ERP solution in turn forces the organisation to take further coercive measures to force usage of the solution, closing the loop. This relationship has been discussed as part of proposition 5C-2.

### 5.17 Summary of Findings

This chapter portrays the complex and dynamic interplay of the ERP implementation challenges. The feedback loops depict the interconnectedness of ERP implementation challenges and the direct or indirect influence they exert on one another, hence leading to numerous reinforcing cycles. Reinforcing cycles can, however, be transformed through the implementation of counter measures (Akkermans & van Helden, 2002). The next chapter, therefore, seeks to explore the different coping mechanisms employed by the organisation.



## 6 Coping Mechanisms to Overcome ERP implementation Challenges

This chapter describes the coping mechanisms used by organisations to overcome the ERP challenges encountered during their ERP implementations; it answers the following research question: *How can organisations overcome their ERP implementation challenges through the use of coping mechanisms?*

### 6.1 Organisation of Chapter

Section 6.2 provides an overview of the different coping mechanisms deployed by the organisation. Sections 6.3 to 6.8 describe the coping mechanisms put in place by the organisation and their relationships with the ERP implementation challenges. Key propositions are derived and discussed in section 6.9.

### 6.2 Identification of Coping Mechanisms

This section discusses the coping mechanisms put forward by the organisation in an attempt to overcome its encountered implementation challenges. Numerous organisational, management, change, knowledge, project and technical challenges were unveiled in chapter 4. In chapter 5, the dynamic interplay between the different ERP implementation challenges was presented. The coping mechanisms sought to overhaul the identified challenges in order to reduce the gap between executive and operational employees, whilst also aligning the operational and strategic objectives. Employees in the organisation were aware that, despite the numerous challenges they faced, the new processes and new enterprise solution implemented in the organisation would be a long term endeavour.

*“We do not have any way of getting out of SAP. SAP is where we are going, the question is how we can close the gap ...” MM1B.*

Figure 6.1 depicts the different coping mechanisms put forward by the organisation to cope with its ERP implementation challenges.

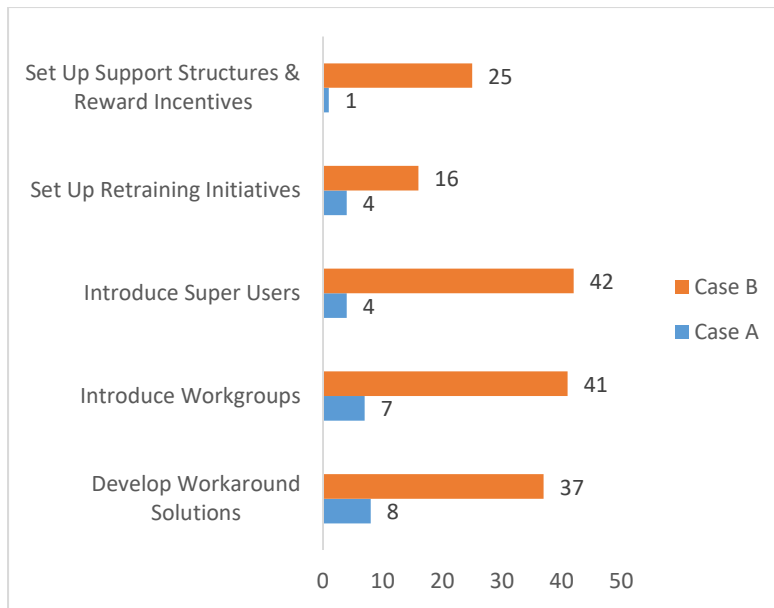


Figure 6-1: Coping Mechanisms Used by the Organisation

As depicted in Figure 6-1, the coping mechanisms used by the organisation were mainly discussed by participants from case B. The primary coping measures used by the organisation included development of workaround solutions, introduction of workgroups and super-users. Other measures employed included deployment of retraining initiatives, support structures and reward incentives.

The next step involved a co-occurrence analysis between the identified coping mechanisms and the ERP implementation challenges as previously discussed in chapter 5. The results are portrayed in Table 6-1.

Table 6-1: Co-occurrence Coefficient Values between Coping Mechanisms and ERP Implementation Challenges

	Develop Workaround Solutions	Introduce Workgroups	Introduce Super-users	Retraining Initiatives	Support Structures and Reward Incentives
CM	0	0,01	0,01	0	0
ESI	<u>0,17</u>	<u>0,1</u>	<u>0,06</u>	0,02	0,02
IUI	0,01	0,04	<u>0,08</u>	0	0,01
ICM	0,02	<u>0,06</u>	<u>0,05</u>	<u>0,06</u>	<u>0,05</u>
LMM	0	0	0	0	0
NAO	<u>0,07</u>	0,02	0,02	0,05	0,02
LSK	0,02	<u>0,08</u>	<u>0,05</u>	<u>0,05</u>	0,02
PC	0,02	0	0	0,02	0,03
EOC	0,01	0	0	0	0
RTC	0,06	0,02	0,02	0,04	0,04
IUR	0,04	<u>0,06</u>	0,02	0	0
WL	0	0	0	0	0

The strength and frequency of the occurrences were carefully analysed to establish the legitimate and stable relationships between the ERP implementation challenges and coping mechanisms. A c-coefficient > 0.04 was used as a benchmark to identify the dominant relationships from the weaker ones. The relevant relationships have been bolded and underlined as reflected in Table 6-1. The next sections describe the identified coping mechanisms and provide an analysis of the underlined relationships.

### 6.3 Develop Workaround Solutions

Use of workaround solutions was discussed mostly by participants from case B, with the exception of a few references to the workaround solutions by managerial and support-users in case A. This is depicted in Figure 6.2. Workaround solutions include the use of legacy solutions and development of bespoke solutions.

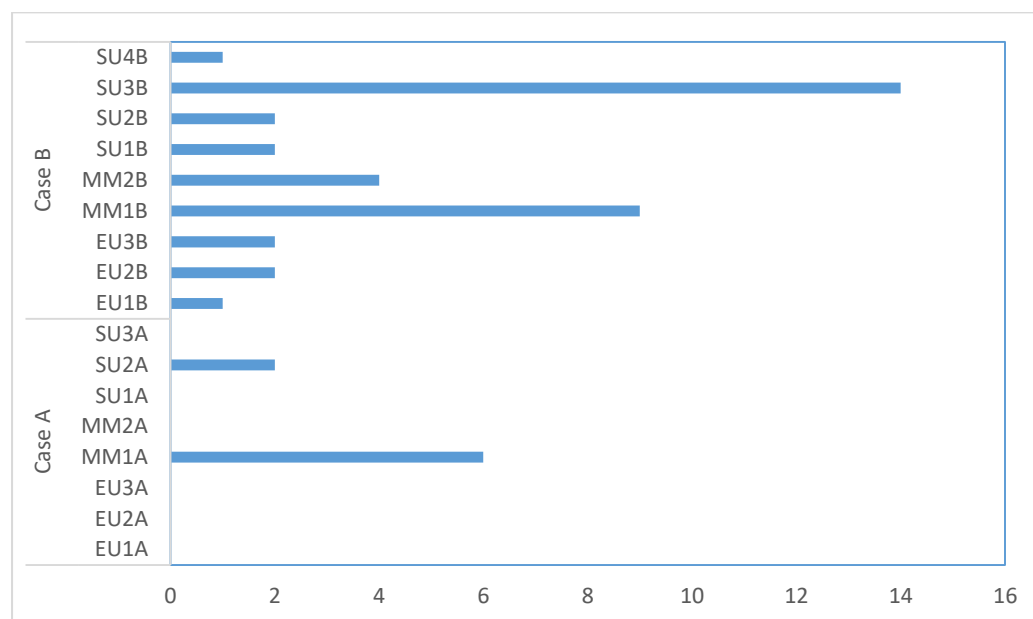


Figure 6-2: Use of Workaround Solutions

#### 6.3.1 Use of Legacy Systems

The ERP solution inadequacies led to situations where employees were compelled to use their legacy systems in addition to the ERP solution. The lack of core required functionalities of the ERP solution implied that use of their legacy solution had to be sustained.

*Yes SAP PPM was supposed to replace [the WFMS], but it did not happen”*  
EU2B.

*“... We cannot get rid of the legacy system until SAP is fully functional”*  
EU3B.

Consequently, project information had to be duplicated in multiple applications as employees could not rely solely on the use of the enterprise systems solution to cater for all their needs.

*“Currently all the functionality of PPM will not replace what is being done in [the WFMS], that’s why we have the difficulty of using 2 systems” MM1B.*

### 6.3.2 Develop Bespoke Solutions through use of Ms Excel and Access

With the rollout of the SAP vanilla solution, employees were required to forego their critical customised applications which were not catered for by the ERP solution. In an attempt to overcome this shortcoming, the different business units were compelled to deploy alternate, local solutions. For instance, the implementation division resorted to the use of MS Access to supplement the inadequacies of the ERP solution. Through the use of MS Access, local and bespoke applications were once again developed.

*“[Support user] is sitting in this office, creating another access database for us for us to do what we did before they gave us the system as they took away some of our core functionalities when they put this solution on the table. They took away another system that we had ... they have been working for a couple of months now to put another solution on the table for us to use in the region because we do not have a national tool up and running” MM2B.*

Moreover, the ERP solution only provided standardised reporting functionalities. To meet the reporting requirements, the data from SAP PPM had to be extracted to spreadsheets and the required information manipulated through use of different custom-built tools.

*“SAP PPM is not working as it should have. ... We still have to do some programming outside of the system and we basically do this on Excel at the moment. Anything, we want to change in standard reports from PPM, we basically do it in Excel at the moment” MM1B.*

### 6.3.3 Purpose of Workaround Solutions

Workaround solutions were developed to cope with the numerous inadequacies of the ERP solution. A c-coefficient value of 0.17 depicting a strong negative correlation between the two variables is noted. A correlation between workaround solutions and negative affective outcome is established through a c-coefficient value of 0.07. The positive correlation between these two variables suggests that use of workaround solutions will increase the negative affective outcome of employees. These relationships are reflected in Figure 6-3 and subsequently discussed.

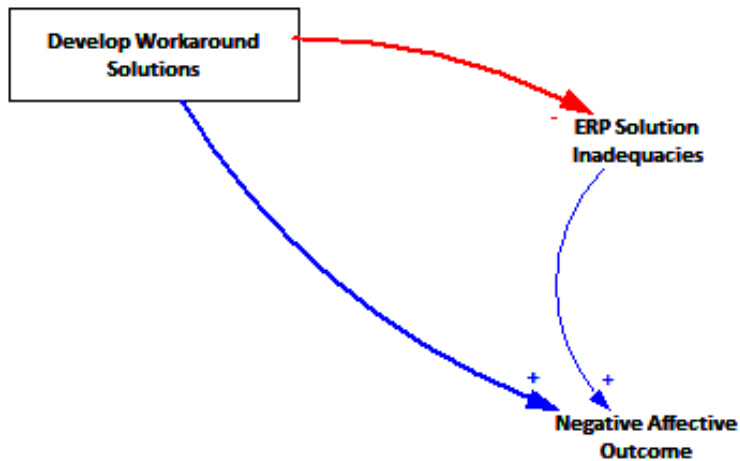


Figure 6-3: Correlation between Workaround Solutions and ERP Solution Inadequacies

#### Develop Workaround Solutions – ERP Solution Inadequacies

In the wake of the implementation, employees struggled to execute their assigned tasks through the sole use of the ERP solution. Consequently, employees used numerous workaround solutions which included use of their legacy solutions, development of bespoke solutions and use of MS Access and Excel to supplement the use of the ERP solution.

*“[Support user] is developing a new tool that is going to assist us with SAP PPM because SAP PPM is not providing us with all the functions that we need as a department” SU3B.*

#### Develop Workaround Solutions – Negative Affective Outcome

A relationship between workaround solutions and negative affective outcome was also unveiled where development of workaround solutions led to the frustration of employees.

*“It was frustrating ... a lot of work had to be done outside the system through use of spreadsheets” EU3B.*

### 6.4 Introduce Workgroups

Regarded as organisation-wide strategies, the workgroups were set up in an attempt to rectify the misalignments and challenges of the ERP implementation.

*“So we come and put down a system into the business and now we find endless challenges on the system. So what is the solution: set up user groups where we can discuss the issues” SU4B.*

*“... Then we decided with the formation of the work groups. Then we start having all these workgroups dealing with PS, PPM, cProjects ...” MM1B.*

Although different workgroups were formed to deal with the numerous ERP modules, this chapter reports solely on the SAP PPM workgroup. Use of workgroups was discussed mainly by participants from case B, with only some mentions by support-users and managerial employees from Case A, as depicted in Figure 6-4.

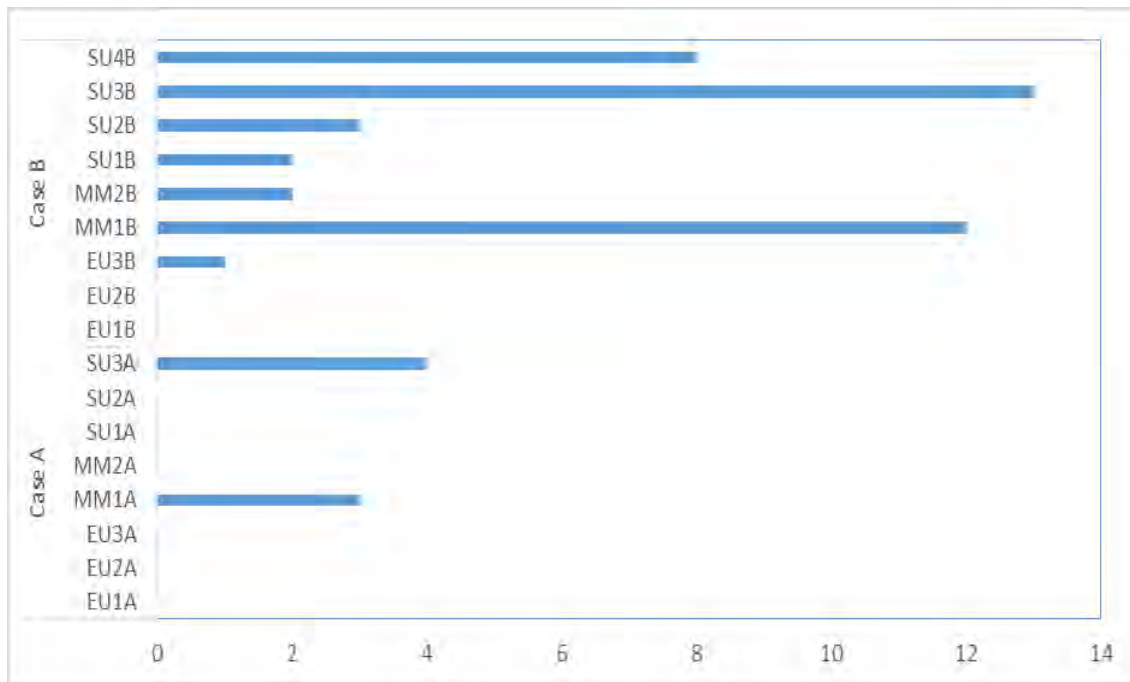


Figure 6-4: Use of Workgroups

#### 6.4.1 Introduce National Workgroup

The primary objective of the national workgroup was to understand and sort out the numerous challenges faced by the different operating units.

The national workgroup was made up of representatives from different business units. The representatives, in turn, were initially scheduled to meet on a monthly basis. Since SAP PPM was seen as a strategic tool for the organisation, the national workgroup was chaired by representatives from executive management and attended by the CFO and CIO.

*“That would be the SAP PPM user group and also because PPM is actually also a very critical application for the business, the CFO and CIO would also be involved” SU3A.*

Additionally, each of approximately 70 operating units was tasked with the selection of key representatives to be part of the national workgroup.

*“There are about 73 OUs [operating units] that would send representatives to the meeting” MM2B.*

The meetings were attended by designated representatives from senior management, selected financial directors, middle level management representatives, project managers and selected end-users from each province, nominated employees from different operating units and enterprise system representatives (consultants and developers).

*“System controllers, project services managers, some portfolio managers and in-house trainers. You will have programme and project managers, you will have quite a few project controllers. Then there would be the*

*involvement of the financial directors at a national level. They are the ones who make decisions” SU3B.*

#### 6.4.2 Further Complexities

##### Unmanageable Workgroup

At the outset of the national workgroups set-up, representatives from all over the country were flown to the meeting. This resulted in a large group of more than 150 people attending the national workgroups. These meetings became difficult to manage, with representatives complaining over their regional issues.

*“When we started it was chaos because the guys were now sitting with a system which was not working and they said we need to have representation from all parts of the business. And suddenly your user group was this big group worth 150 people. You don’t solve problems in the user group like that. The way the user groups were running was not effective. It was more like a moaning session, you come and moan and then you get on the plane and go home” SU4B.*

Although the intent of the meetings was to solve the post-implementation challenges of the ERP solution, very little time was dedicated to discuss the actions required to overcome the limitations. Initially, the national workgroup was the only platform where stakeholders could discuss and share their concerns and, at times, it took employees the whole day to just go through and listen to everyone’s challenges.

*“... so although the intent was, retrospectively, to now involve the business to come up with a solution, those user groups was not adding any value because what was happening was that by the time you got to everybody going through the issues, we came to the end of the meeting” SU4B.*

##### Costly Initiative

Moreover, the national workgroups added to the organisation’s financial challenges. Flying business representatives on a monthly basis led to another major financial constraint, further cementing the organisation’s financial predicament.

*“It was a day forum flying people all over the country. It was a huge cost to [the organisation]. And to have people from every single business unit attend was too costly and I don’t think you could ever have an effective workshop. It is just too many people” SU3B.*

*“It is a huge meeting and an expensive meeting to hold as well” MM2B.*

Subsequently, to tackle the cost issues, the organisation eventually changed the monthly workgroups to quarterly recurrences and reduced the attendee group size, restricting the number of representatives attending the national meeting.

*“The national workgroups were monthly for a year and a half and then they changed it to quarterly” MM1B.*

*"I have not attended these national meetings lately because we do have a restriction on travel. So [MM2B] is the one going to the meeting. If she feels she needs someone, she needs to motivate it and we will go along"* SU2B.

#### 6.4.3 Introduce Regional Workgroups

The above-mentioned complexities and changes gave rise to the initiation and set-up of regional SAP PPM workgroups as a measure to overcome the issues that arose from the national workgroup, owing to its sheer size and resulting complexity. The organisation, thereafter, introduced regional workgroups across all provinces to optimise the process.

*"I said look we are in a financial crisis, we need to optimise what we are doing. Within the geographical areas, the guys should rather come together from the different business units and discuss and understand what are the issues and challenges they have"* SU4B.

The regional representatives were perceived as a reasonable solution as it allowed different operational units within a province to start collaborating on a smaller scale. Issues could be discussed and shared across the regions and potential actions and solutions could be proposed.

*"Just to get the guys to start talking to each other and to support each other within geographical areas and then also use that user group as a stepping one to the national user group. So whatever the issues are within the area, and there are maybe six operating units sitting here, you come together, you identify them and you send one representative to the national user group. In that way, you ensure there is representation covering these operating units and also there is common understanding"* SU4B.

Regional workgroups allowed regional representatives from different operational units within a province to meet up in order to discuss and evaluate their concerns. The regional workgroups included key end-users, middle level managers, project managers, engineers, selected end-users and support-users from different operating units and selected regional IT staff. These meetings were also run on a monthly basis in the initial phases.

*"Most of the regional user groups were with the system controllers, managers and project managers. We have a compliance officer and we have support staffs and representatives from middle management. We have regional IT support staff and a business support analyst from IM unit"* SU3B.

Issues that were identified and logged by employees were subsequently scrutinised and consolidated at regional level and potential resolutions/solutions were discussed.

*"So whatever the issues are within the area, and there are maybe six operating units sitting here, you come together, you identify them and you*



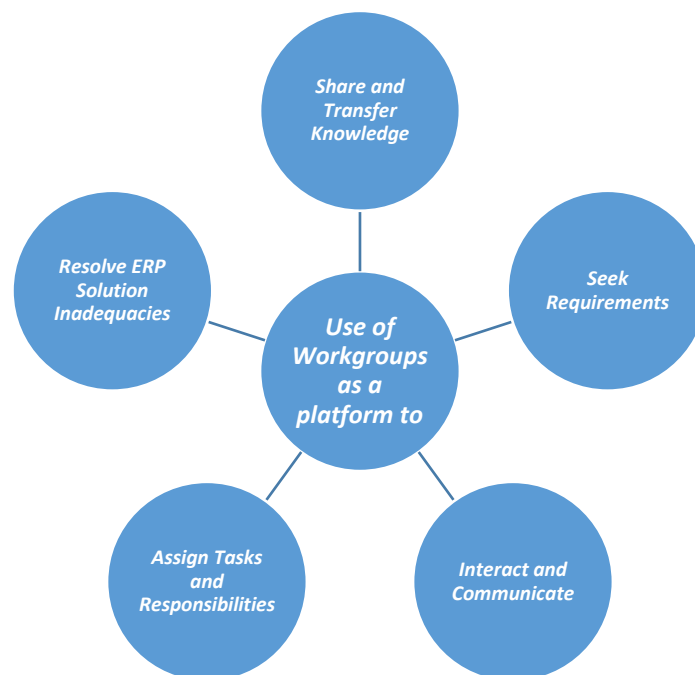
*send one representative to the national user group. In that way, you ensure there is representation covering these operating units and also there is common understanding” SU4B.*

Regional representatives would then elect a national representative to represent the region in the national workgroups where the consolidated issues and potential resolutions would, then, be raised.

*“And the regional user group will nominate who their national representative would be. That person would go there and talk for the different operating units” SU4B.*

#### 6.4.4 Purpose of Workgroups

Through the workgroups, stakeholders devised solutions to resolve the ERP solution inadequacies. The workgroups also served as a knowledge-sharing platform where different stakeholders collaborated. Moreover, the workgroups were used as a common ground to seek requirements from the different business units, to interact and communicate and to assign key tasks and responsibilities to the designated stakeholders. Figure 6.5 depicts the purpose of the workgroups.



*Figure 6-5: Purpose of Workgroups*

Therefore, the primary purpose of the workgroups was to overcome the numerous knowledge, change and technical challenges. The negative correlation between workgroups and ERP solution inadequacies, inadequate user requirement, lack of shared knowledge and ineffective change management initiatives is depicted in Figure 6-6. The c-coefficient values between the variables are underlined in Table 6-1.

*“What the business has done is there have been workgroups that have been formed to deal with the limitations of PPM and cProjects and they have monthly meetings to deal with all the different issues experienced” MM1B.*

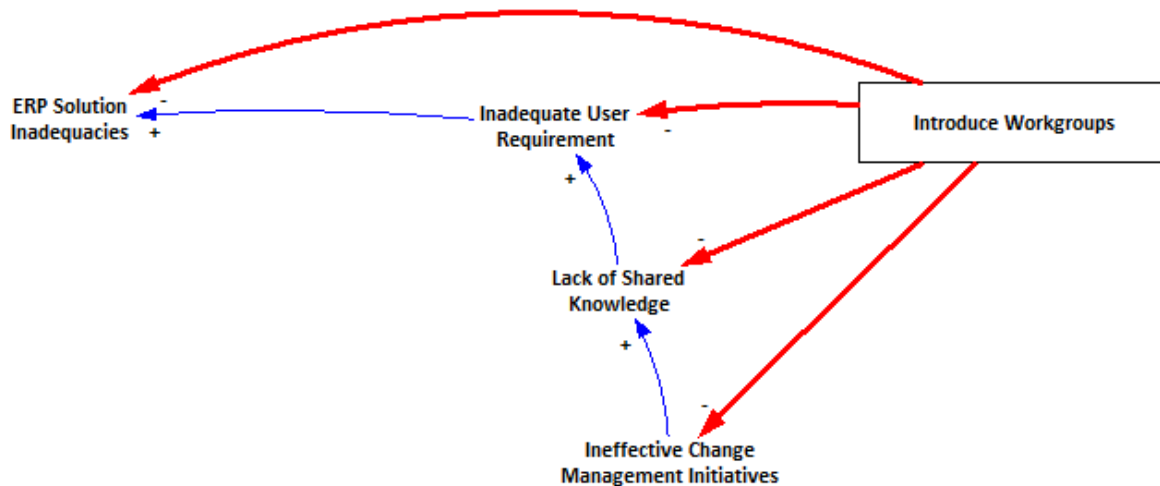


Figure 6-6: Correlation between Workgroups, ERP solution inadequacies, Inadequate User Requirement, Lack of Shared Knowledge and Ineffective Change Management Initiatives

### Workgroups - Resolve ERP Solution Inadequacies

One of the prime objectives of the workgroups was to understand and sort out the numerous functional, data, customisation, integration and performance limitations of the enterprise solution encountered by the different operating units. The SAP PPM solution had numerous limitations which were yet to be resolved by the organisation.

*“The purpose of the workgroups was once again to sit, discuss and share the issues that we have, to find out how the issues that we have on SAP PPM can be resolved” SU3B.*

In one such example, employees initially expressed their concerns with the lack of system configuration whereby the same information input had to be replicated several times on various systems in order to complete an operation. Through the workgroups, employees made their voices heard for the system to be configured.

*“They implemented some of our requests. ... On one of the screen you type in information and on the next screen it is the same information. Through the workgroups, we asked them to duplicate information” SU1B.*

Moreover, through the workgroups, the organisation tried to set up manageable timelines to address the pending issues. The issues were prioritised based on their impact within the organisation. Critical issues were addressed first and specific timelines were assigned. This practice enabled the organisation to successfully resolve some of the more pressing issues.

*“Through the workgroups, we were able to set up different milestones in terms of when certain issues will be solved so the users know that issues are being attended to and by when it could be solved and all these milestones could be met from there” MM1B.*

The new SAP solution lacked core functionalities. Regional and national representatives discussed the potential reasons accounting for non-use of the ERP solution and consultants proposed functionalities which could be put in place to mend the gaps. Through their interaction with key internal stakeholders, consultants attempted to address the limitations of the enterprise solution.

*“We will have to tell them [consultants] why the system is not being used and they will say we can build that functionality and provide it for you” SU3B.*

New functionalities were subsequently added to enhance users’ expectations and experience. Through the workgroups, feedback and ideas were shared and debated and consensus reached on whether the added functionalities would benefit the different business units.

*“If it is a functionality that we want to implement as well for our operating unit, then we will roll it out and all the concerned users will be trained” MM1B.*

#### **Work Groups – Increase Shared Knowledge amongst Stakeholders**

The workgroups were seen as a platform for the different business units to discuss and share knowledge pertaining from the implementation challenges. The regional and national workgroups enabled employees, regional representatives, national representatives, consultants, executive management and the enabling IT department to collaborate and facilitate knowledge flow amongst the different communities and business units in order to reach a shared understanding.

*“The only way that there is knowledge sharing amongst the employees is via the workgroups” MM1B.*

Both the regional and national workgroups allowed employees to exhibit a consolidated representation of their concerns and to discuss possible solutions and seek agreements on the way forward. End-users would send their concerns to the regional representatives who, subsequently, would share these within their respective regional workgroups before reporting to the national workgroups.

*“The end-users send the issues to the super-users, as the idea is to consolidate all the issues before reporting back to the workgroups. You will find that other regions have experienced a certain fix to an issue, they will share across to say this is how you can fix this issue. That’s how the link works with the workgroup” MM1B.*

Employees considered the one positive aspect of the SAP implementation to be that it enhanced collaboration amongst the different business units. Prior to the ERP implementation, each business unit operated independently and seldom engaged in any knowledge-sharing practices. However, with the formation of workgroups, the business units began to operate in a cohesive fashion.

*“Before you used to sit in pockets ... you sat in your silos. But now with the way the business is structured, you are forced to collaborate. If there is anything good that came out, is the fact that through the workgroups collaboration is now taking place at a much greater level now than before”*  
SU4B.

#### Knowledge-Sharing between Super-Users and Regional Representatives

The regional workgroups served as an opportunity for selected regional representatives and super-users from each business unit within a region to discuss the issues they encountered in their respective departments, along with the magnitude and impact of the issues. Regional representatives used their newly forged alliances to cooperate with other regions to resolve issues aptly. Regional representatives from each region relied on their counterparts from different regions to discuss, understand and solve issues on hand. Knowledge-sharing amongst the regional representatives led to a general understanding of the regional situations across the country. When faced with unexpected issues, regional representatives engaged with the representatives from other regions to verify whether the latter came across similar issues and to seek solutions.

*“For instance, if I am sitting here and I am experiencing a problem with the system. I would then pick up the phone and ask my counterpart in East London, and say I am experiencing this problem. What is happening on your side? And the work relationship would go on like that. And she would say let us test this ... then the next day, we contact the person in Durban”*  
SU3B.

#### Knowledge-Sharing between Regional and National Representatives

Issues which could not be resolved at a regional level were, subsequently, taken to the national meetings. The national representatives from each operating unit relayed information to the national workgroup. They would share their concerns with different stakeholders, including the national representatives from different operating units and regions, as well as consultants, and determine the impact of the issues and potential workarounds. The strategies employed by different regions to overcome certain issues were shared and helped achieve a common understanding of both processes and issues. This practice ensured that knowledge was shared throughout the organisation whilst also ensuring that executive management was made aware of the organisational-wide situations.

*“That same knowledge is transferred to the national representatives to say these are the issues we experienced from our operating unit, did you have a similar issue? ... If they have not yet experienced the issue, we would tell*

*them how to resolve it, should they get it. And they will do that same with their issues and potential solutions” MM1B.*

### Top-Down Knowledge-Sharing Strategies

The national representatives conveyed the feedback obtained from the national workgroups to their respective regions and regional workgroups.

*“Information is fed back to the operating units through the regional user groups and the national workgroup. Key representatives will convey the information further down the line” MM2B.*

The regional representatives would then pass on the information to their respective units, thereby ensuring that knowledge transfer was permeated throughout the organisation.

*“After the regional workgroups meetings, I would provide feedback to the employees” SU3B.*

*“[Support user 3] was attending the user groups. She was giving us the information and updates” EU1B.*

### Knowledge-Transfer from National and Regional Representatives to Consultants

Since the onset of the implementation, one of the pertinent criticisms referred to the lack of internal knowledge of external consultants. Through the workgroups, the stakeholders tried to bridge this disconnect. The regional and national representatives and designated stakeholders used this platform to ensure the transfer of tacit internal knowledge to external consultants, in an attempt to provide them with some insights on the structure of the organisation and the role ownership of different employees. Consultants also used this platform as a means to interact with different stakeholders to understand and clarify the operational roles and responsibilities of employees from different business units. The fact that the organisation operated in silos implied that the responsibilities of a particular role would vary across the different business units. The consultants tried to reach an agreement on the best possible way to standardise and realign the roles and responsibilities of designated group of employees.

*“We also provide the consultants with suggestions because we are more involved with the users here. If I know these are the roles of the project controllers and these are the roles of the project coordinators and the consultants do not know, I would say this is their task and this is what is supposed to happen and we would discuss how to standardise the process” SU3B.*

### Knowledge Transfer from External Consultants to Internal Stakeholders

The reverse was similarly true. External consultants shared their extensive technical knowledge and provided super-users and key stakeholders with deeper insights of ERP solutions which, in turn, eventually, served to facilitate understanding of the ERP solutions. For instance, super-users used this platform to liaise with external consultants to

understand how to retrieve required information from the ERP solution when such situations arose.

*“We have consultants and programmers who are part of the national user groups, so we ask them how to get to a certain report, how is it possible to run a specific function ...” SU3B.*

### Workgroups – Seek Requirements

- *Understand Requirements of the different Business Units*

Another objective of the workgroups was to provide a standard unified platform where different stakeholders were able to express and interact with each other in order to understand and clarify the business needs and requirements and reach consensus. As previously mentioned in chapter 4, the different business units operate as silos and, due to the lack of standard practices, standard user requirements for the different regions did not seem viable.

*“... But if you look at something like SAP PPM, because the system is an organisation-wide one, you generally have a lot more stakeholders and a lot more difficulty getting agreements to get the user requirements inked down ...” SU3A.*

The fact that user requirements were not adequately sourced and consolidated led to a solution which did not meet business requirements. The national workgroups, therefore, metamorphosed into a platform where different stakeholders including representatives from different regions, executive management and external SAP consultants could share their concerns and discuss their major challenges and core requirements.

*“So what we are trying to do is instead of getting the requirements right up-front, and involving users from the start, we were now sitting with a system which was not giving us what we want. Now we created user group forums to understand the requirements of the different business” SU4B.*

The workgroups were perceived as a convenient means to understand the requirements across the different regions. Through the workgroups, employees could differentiate between the common requirements across the organisation and the ones unique to their business unit.

*“Through the workgroups, we could discuss and make sure that we understand the requirements across regions ... so we had some consistency in that” SU1B.*

Initially, external consultants did not exhibit an adequate understanding of the core requirements from the end-users' perspective. Through the workgroups, consultants interacted with the different national and regional representatives and relevant key stakeholders, enabling them to garner the functional knowledge. The desired functionalities as professed by end-users from each business unit were discussed and assessed. The regional and national representatives, being more knowledgeable about the end-users'

needs in their respective region, provided the necessary clarifications on the core and actual requirements of the business units.

*“... We conveyed the main requirements that were needed both regionally and nationally to the consultants” SU3B.*

*“In the early times of the meetings when the national user group meeting was just established, we had a lot of consultants involved. The purpose was for them to get an understanding of the actual need and requirements of the business” MM2B.*

### Workgroups – Address Ineffective Change Management Initiatives

- *Improve Interaction and Communication*

The workgroups served as a medium for face-to-face communication whereby various stakeholders could interact. Not only could regional and national representatives share their concerns with executive management and internal stakeholders; they could also interact with the external consultants and developers. Prior to the rollout, employees had minimal interaction with the consultants. Through the workgroups, they were able to engage in direct conversations with the consultants, share their concerns and discuss potential solutions to overcome their critical issues.

*“You get to understand the issues that you did not pick up originally and you get to know the users’ views from different regions, how they feel and most importantly you get to interact with people who are hands- on who are developing the system and understand how it works. They will be able to provide us with an answer right then” SU3B.*

The workgroup also served as a platform for consultants to report on the progress of their assigned tasks. External consultants provided feedback on the development of the new functionalities and presented the concerned stakeholders with an update on the pending tasks.

*“The purpose of the workgroups was to report on the progress of development work [the consultants] are doing or on abstaining development” MM2B.*

*“Well it varies, quite often it was to report on the progress of development work the consultants and developers are doing” SU2B.*

- *Assign Tasks and Responsibilities*

The workgroup served as a means to assign clear ownership of tasks and responsibilities of the respective group of stakeholders. Following the discussions from the national workgroups, specific actions were assigned to different groups of stakeholders, based on the roles and responsibilities assigned to them.

*“The team would be established ... in terms of your roles this is what you will be doing and we ascribe responsibilities at the meeting ... out of that*

*discussion the action items will be assigned to one of the members of the workgroup ...” SU4B.*

Key actions included development of new functionalities, fixing data issues, investigation and analysis of concerns, testing of new functionalities, system monitoring and data clean-up activities. Stakeholders were given ownership of specific tasks for which they were responsible for execution and completion.

*“I will go to the national user group and they will say, this is the exercise that we will be doing now. And we will follow the instructions as assigned” MM2B.*

*“Through the workgroups, we would say here is the issue, how can we solve it ... we would assign clear responsibilities of who needs to resolve the different issues” MM1B.*

## 6.5 Introduce Super-Users

Each operating unit was required to assign at least one support-user to the workgroups. Management from different divisions therefore appointed employees who subsequently became the super-users of the enterprise solution. Super-users would represent their respective departments regionally and nationally when required.

*“As a manager, you are then required to appoint a certain super-user to represent you in terms of rolling out of all the enhancements ...” MM1B.*

Use of super-users was discussed mainly by participants from case B, with only some mentions by support-users and managerial employees from Case A, as depicted in Figure 6-7.

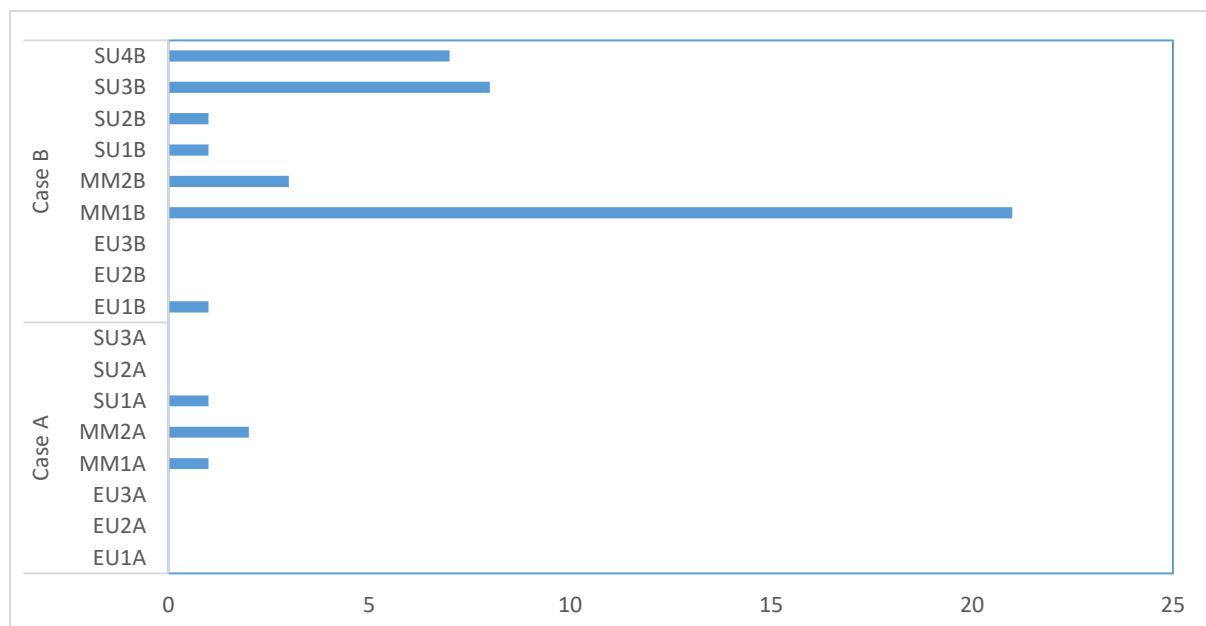


Figure 6-7: Use of Super-Users



Resources assigned were not only required to exhibit a good understanding of the work practices of the department; they also needed to have a thorough appreciation of the end-users' needs and had to be technically sound. Resources exhibiting different skill-sets were assigned to the workgroups to ensure the operating units had comprehensive representation and understanding of users' needs, and to ensure that there were adequate resources to cope with the requirements arising from the different workgroups.

*“Inherently, you have one person who is good in programming and you have the other one who is the boss and understands the integrations and the other one who is an actual end-user who is using that program. So you have different facets and you can easily close the different gaps” MM1B.*

The chosen super-users played many roles. They acted as intermediaries between different stakeholders and provided immediate support to end-users. Super-users also oversaw key processes, tested new functionalities, and had the responsibility of developing workaround solutions and providing end-user training.

#### 6.5.1 Purpose of Super-Users

The primary purpose of super-users was to overcome the change, knowledge and technical challenges. The negative correlation between use of super-users, inadequate user involvement, ERP solution inadequacies, and lack of shared knowledge and ineffective change management initiatives is depicted in Figure 6-8. The c-coefficient values between the variables are highlighted Table 6-1.

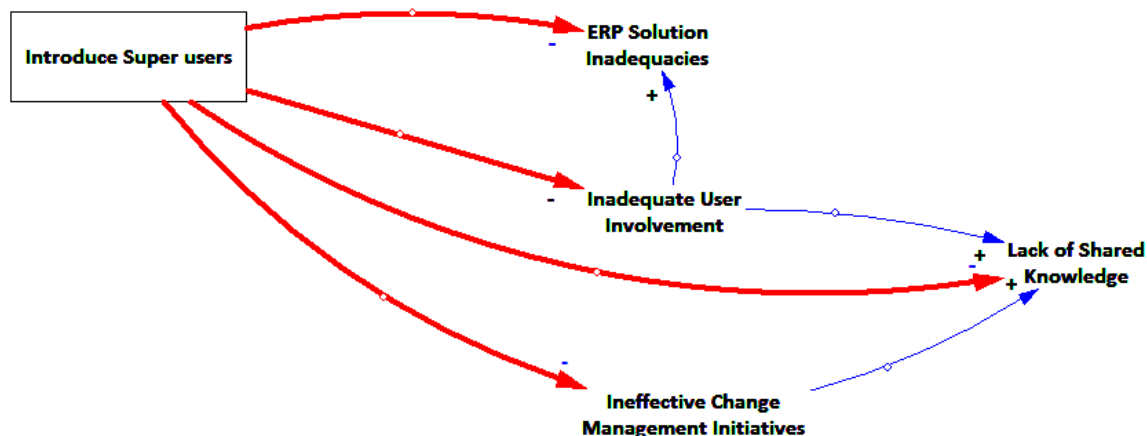


Figure 6-8: Correlation between Super-users, ERP Solution Inadequacies, Inadequate User Involvement, Lack of Shared Knowledge and Ineffective Change Management Initiatives

#### Super-users – Improve User Involvement

A prominent implementation challenge revolved around the lack of user involvement during the implementation of the new ERP solutions. This consequently led to a wide knowledge gap between various stakeholders, ERP solution inadequacies and inadequate user requirements. It was only after the implementation, when numerous concerns were raised, that the business realised the need and importance of involving users. The organisation

attempted to overcome this challenge by selecting employees to act as super-users of the enterprise solution in order to devise appropriate reform resolutions. The designated employees were responsible for voicing the numerous concerns that each operating unit was facing in order to come up with a solution.

*“So what we are trying to do is instead of ... involving users from the start, we were now sitting with a system which was not giving us what we want. ... The intent was, retrospectively, to involve the business through the use of super-users to come up with a solution” SU4B.*

### Super-users - Enhance Shared Business Knowledge

One of the primary roles of the super-user was to act as an intermediary between external consultants, executive management, technical employees and end-users. Each super-user was required to represent the department in both the regional and national workgroups and become the integral voice of the end-users. The super-users, who were more knowledgeable on end-users' needs from their respective region, exhibited a holistic understanding of the organisational business need, whilst also boasting good technical skills. They became the integral voices of the end-users and attempted to decrease the knowledge gaps between the different stakeholders in an attempt to reach a shared business understanding.

*“... I talk in my technical IT language and end-users speak in their technical engineering language and the others would be speaking in their advanced financial language, how do we translate our tacit knowledge effectively to make sure that everyone has shared business knowledge. So you have to combine all of those and make them one this is where I come in” SU3B.*

### Super-users – Address ERP Solution Inadequacies

- *Provide Workaround Solutions*

Due to the unique operational requirements of the different business units, their reporting needs could not be met through the generic functionality of the ERP solution. Managerial employees from different units continued to request customised reports from their technical teams who would be compelled to draw up the required reports despite the perceived difficulty levels. As part of their responsibilities, super-users developed workaround intermediate solutions to bridge the reporting functionality gaps of the ERP solution. The designed solutions were crucial to fulfil the reporting requirements of each business unit.

*“There comes a problem when it comes to reporting because we have various managers from various sections and they want their reports to be developed differently. So that’s where I come in. I do some development especially when it comes to the reporting requirements” SU3B.*

- *Test ERP Solution*

The super-users were also entrusted with system testing of newly implemented functionalities. Once the new functionalities were developed by consultants, super-users

were tasked to perform a battery of tests to uncover any issues relating to functionality, data and output, and performance discrepancies. Errors uncovered were raised, fed back to consultants and potential solutions or workarounds were discussed in the national workgroups.

*“My main role is to test and provide suggestions, we would normally test the system with the consultants and national guys, to say ok guys so you say you are done with these modules, so can we test to see whether it is ok. We also provide them with suggestions because we are more involved with the end-users here” SU3B.*

Through this process, super-users not only familiarised themselves with the new functionalities, but also gathered experiential knowledge based on their testing and interaction with the consultants. Once the super-users were satisfied with the end result, the functionality was rolled out to the different regions.

- *Monitor System Compliance*

Super-users were also required to ensure that the enterprise solution was being used as intended and that the required information was being captured within the enterprise solution, all whilst ensuring data accuracy.

*“So as super-users, our role is to also ensure that the information is captured on the enterprise solution. We are supposed to provide management with accurate information which was one of the main foundations of the implementation” SU3B.*

Moreover, super-users had to comply with the given instructions to ensure that the required quality tests had been performed on the data according to national instructions.

*“... we will receive weekly feedback from someone who will be checking our data, whether our data is looking good or not ...” MM2B.*

### **Super-users – Address the Change Management Gap**

- *Provide Primary Support*

Initially, employees felt they were left on their own with the issues experienced and could not get past certain hurdles. Consequently, the super-users acted as the primary support for end-users. At first hand, any issues that were experienced were promptly addressed by the super-users. Super-users ensured they were constantly on the floor assisting the end-users. This meant that end-users could rely upon the immediate help of the former, the moment they experienced a system obstacle.

*“And if they are stuck they will just come ask me for help. They are always welcome in my office anytime” SU1B.*

The organisation’s decision to introduce super-users was a welcome move throughout the business as numerous system issues were solved with efficacy. End-users were not required

to formally log a call for the underlying issues; they could just call upon the super-users who would readily investigate and provide solutions.

*"We had support from [support user 1] and [support user 2 and 3] being there almost all the time. ... They could help us like almost immediately. You did not have to log a call ..."* EU1B.

Super-users were trained as subject matter experts and were expected to be more accustomed to the system, hence a number of system complexities or limitations could be promptly addressed. This practice gradually helped users regain some confidence in the system.

*"... if any issues arise on this module, the super-user will solve it for you, so turnaround times was then tremendously reduced ... and employees started having some confidence in the system"* MM1B.

- *Educate and Train the End-users*

Once new functionalities had been adequately tested and were deployed, super-users were required to educate and train end-users.

*"You train people and they develop a new module and you have to retrain the guys"* SU3B.

- *Assume Process Ownership*

Super-users became accountable to particular processes and were entrusted to monitor specific functions of the enterprise solution. They became responsible for the good communication and resolving of any specific needs or issues arising in their assigned areas of expertise.

*"Should there be any hiccups, I need to find out what the problem might be and try and fix it ..."* SU3B.

Both middle-level management and end-users relied on the different super-users when they required any information which they could not easily retrieve from the enterprise solution.

*"Even today I do not work in PPM. If I want reports, I have to wait for [super-user] to consolidate the information and it takes times. It is a difficult task. If it would have been easy for me, I would not have bothered anyone, I would have gone into SAP PPM, to draw the required reports"* MM1B.

## 6.6 Additional Change Management Initiatives

This category of coping mechanisms includes the retraining initiatives, support structures and reward incentives which the organisation eventually deployed to support the employees.

### 6.6.1 Set up Retraining Initiatives

As a consequence of the numerous issues experienced by the employees in the initial training sessions, a number of retraining requests were made by the latter.

*“... people were not happy with the training ... we have to retrain them at some other stage” SU1A.*

Retraining initiatives were discussed by participants from both cases as depicted in Figure 6-9. All three categories of participants from case B discussed the need for retraining initiatives, while only support-users and end-users from Case A brought up this particular subject.

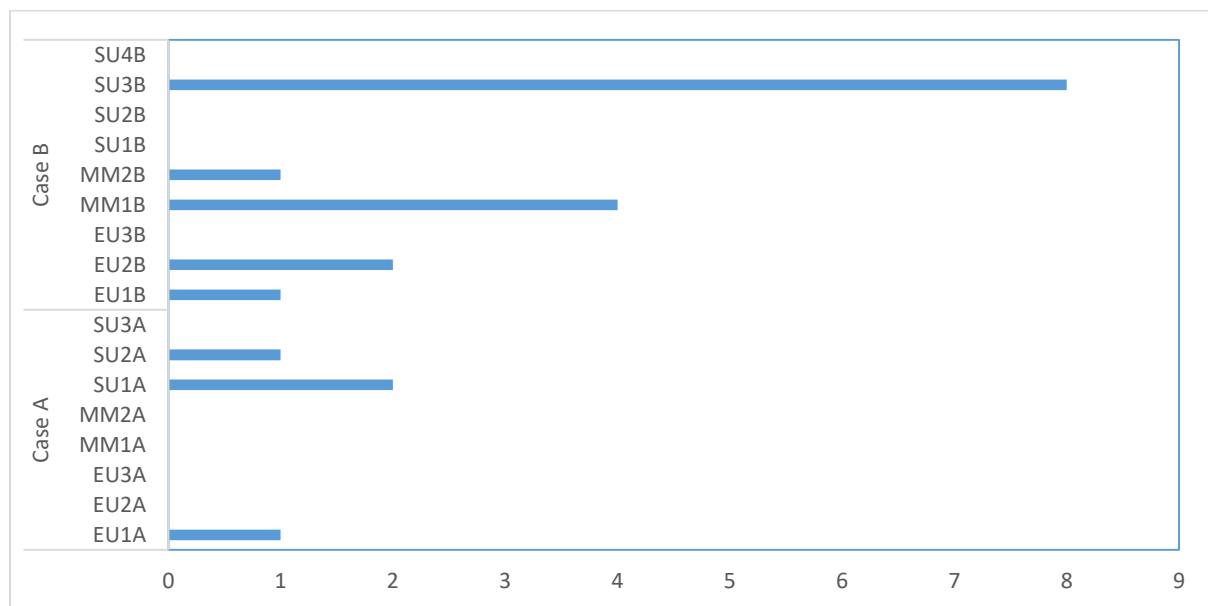


Figure 6-9: Set Up Retraining Initiatives

Following the initial set of trainings, employees assumed they would not be able to effectively utilise the new solution without thorough and improved coaching, owing to their lack of system knowledge. The need for a new round of training was initiated by different operating units and, eventually, retraining initiatives were conducted for the implemented solution. The retraining sessions facilitated through the workgroups and new trainings were conducted across the different provinces. These initiatives were either carried out by in-house trainers or external SAP consultants whenever required. Consequently, employees were required to undergo further training to get familiarised with the new SAP solution.

*“We via our workgroups triggered the retraining initiatives. Through the workgroups, the nationals were notified to have the training again in the Western Cape; the system was run at a national level; we coordinated it from a workgroup perspective. So our representative here from the user group with her counterparts in other environments had the same problems and they started rolling all the re-trainings in all the different environments” MM1B.*

In order to obtain a better training experience, the employees negotiated for a live test server. Their initial training was conducted using a simulation training which they deemed inadequate. After numerous requests and long persuasive arguments, a live training server was made available.

*“We have a sandbox now for PPM, a training server for SAP PPM but it was after a long verbal discussion” SU1B.*

*“I have been busy with retraining people all over [the organisation], retraining the guys from various units on SAP PPM ...” SU3B.*

### 6.6.2 Set up Support Structures and Provide Rewards and Incentives

Management also introduced new support structures and reward incentives to support the employees. Use of support structures was discussed mainly by participants from case B, as depicted in Figure 6-10.

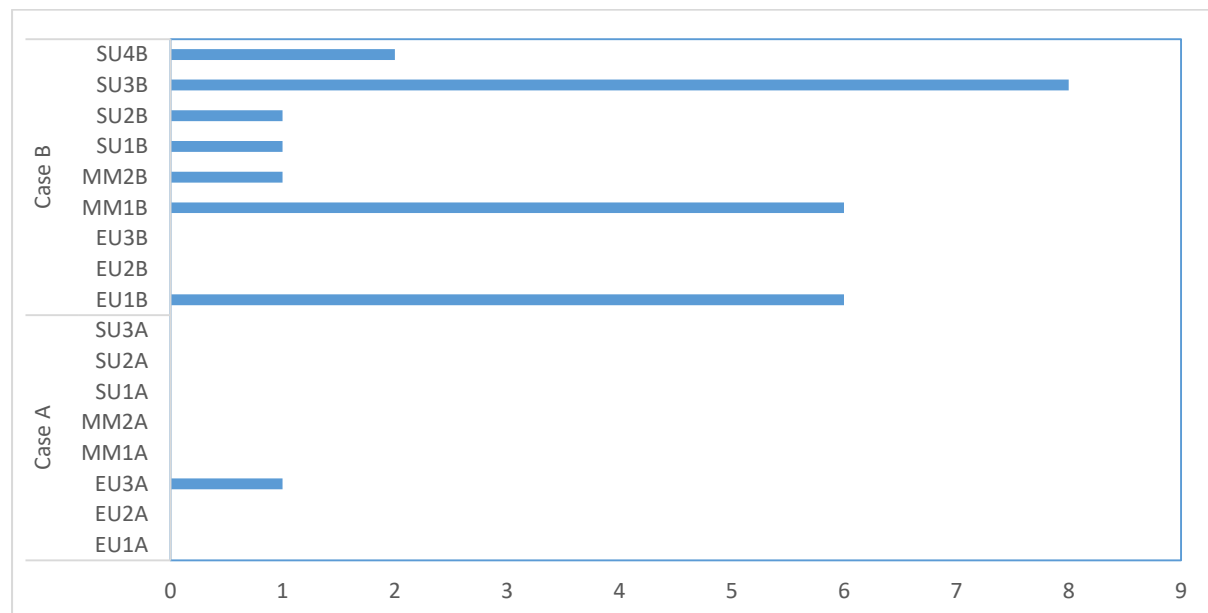


Figure 6-10: Set Up Support Structures and Reward Incentives

#### Set Up Support Structures

With the numerous implementation challenges experienced by employees, management had to establish adequate support structures to provide ground employees with what was meant to resolve unexpected issues. As discussed in section 6.5.1, super-users became the primary support structures for employees. In the beginning, issues that could not be solved immediately by super-users would be consolidated by the super-users into a list to be presented at the regional and national workgroups. During the workgroup meetings, the super-users were tasked with raising the pertinent issues, seeking to understand possible fixes or coming up with workaround solutions. Super-users would then pass down the feedback obtained to the employees of their respective unit.

Eventually, the organisation established a national support team to help the different business units with the challenges that the latter experienced. Issues which could not be

solved by super-users were, therefore, escalated to the national task team for immediate resolution. In such cases, end-users were asked to formally log a request with their super-users and provide as much background information as possible about the particular issue. Once the issues were logged, they were consolidated, based on their priority and impact, and sent to the national task team.

*“Initially, there were not any support structures and now they have created a national task team, so if we have any problems that will be escalated to the national task team and they will then look into the problem. This is a national initiative” EU3B.*

*“... If I cannot fix the issue, I need to follow it up and escalate it to the task team in Jo’burg” SU3B.*

### Set Up Reward Incentives

Management ensured that all the employees were given an extra allowance for working after hours. Due to the number of data conversion errors that had crept in, employees could not complete any of their allocated tasks without having to, first of all, fix the data errors. Moreover, they were required to manually amend the errors themselves. Super-users, along with end-users, had to work after business hours and during weekends in order to address the data errors as soon as possible. Management encouraged employees to work extra hours by the promise of additional incentives and remuneration. This initiative was received positively with a number of employees, willingly, working extra hours in an attempt to fix all the data errors.

*“There was even a time whereby we were asked to manually upload all the schedules that we have for our projects to cProjects, and they even made us work overtime and they paid us for the overtime to ensure that all the schedules as per head office requirements are on cProjects” EU1B.*

*“We had to work after hours and on weekends we had to come and obviously, as a motivational thing, the guys [were paid extra]. But at the end of the day it worked, we sat, we worked, we bought pizzas, we ate, and we worked” SU3B.*

### 6.6.3 Purpose of Change Management Initiatives

The primary purpose of the change management initiatives, as discussed in sections 6.6.1 and 6.6.2, was to address the change management challenges. The negative correlation between retraining, support structures, reward incentives and ineffective change management initiatives is depicted in Figure 6-11. The c-coefficient values between the variables are underlined in Table 6-1.

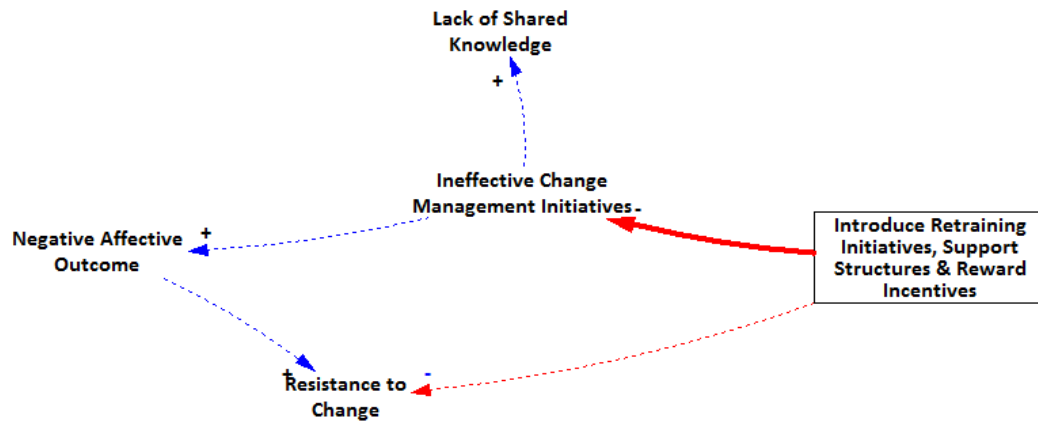


Figure 6-11: Correlation between Retraining Initiatives, Support Structures and Reward Incentives and Ineffective Change Management Initiatives

## 6.7 Middle Management Support

Middle management support, although not considered as a coping mechanism, was a decisive enabling factor in the deployment of the mechanisms. Despite the numerous implementation flaws that cropped up, middle-level management from case B actively supported the coping measures. Middle management from case A, on the other hand, did not show any interest in the deployed coping mechanisms.

### 6.7.1 Provide Support

In order to enhance their position to support their employees, the managers did not shy away from taking the time to learn the system. As substantiated from the following quote, with regard to the implemented new modules, some managers learned and experimented with the module functionalities to assess the capabilities and drawbacks. Once the managers understood the gaps in the solution and the resultant impact, they engaged with the employees to address the latter's concerns.

*"What I did personally was to also learn more about the system first and once I was happy with basically what was in the system and what we will require as a department altogether then I was able to communicate with the users" MM1B.*

The regional representatives were also required to provide weekly updates on the progression of their assigned responsibilities to their respective line managers. Middle management would closely assess and monitor the issues raised.

*"... They were also reporting every week to me to report on the status to say what is solved and what is not solved ..." MM1B.*

This practice has the effect of boosting the confidence of the employees and ensuring that the end-users maintained an optimistic mind-set. Employees felt reassured with the fact that they had instant support from their immediate line managers and they could rely on



their cooperation when and where necessary. Furthermore, middle management constantly reiterated the importance of the change, thereby creating a sense of urgency, establishing commitment, as well as ensuring that information was readily available from different stakeholders.

*“Yes it would have been more difficult without middle management pushing us because you obviously need guidance from them and they needed to provide you guidance as well. They also took time to make us understand the importance of the change. They tried to share the information as well” EU1B.*

*“Our bosses were all very supportive, because they understood the system well, they could look for new things to help” EU3B.*

#### 6.7.2 Allocate Resources per Need

Additionally, management had to ensure that their respective business units were adequately represented at the workgroups. In cases where the departments were major users of enterprise solutions, additional resources were assigned to represent the workgroups.

*“Well we happen to be running most of the modules, so we have three resources from our side and these are super-users who are involved with the work groups” MM1B.*

Initially, case B only had one resource as part of the workgroups, but middle management had to source more resources when it became difficult for the representative to handle the numerous requests from national and regional workgroups.

*“... from our national workgroup, there was just a lot for one person to be able to consolidate for the whole region. ... So to consolidate for everyone was a little bit difficult. And that’s how we decided we need to increase and have more resources” MM1B.*

### 6.8 Project Management Initiatives

The section looks into the required project management practices which enabled the organisation to set up and deploy the above-mentioned coping mechanisms.

#### 6.8.1 Approve Additional Budget

Despite the financial constraint of the organisation, additional budget was disbursed and allocated to numerous business units to cater for the costs of the different coping mechanisms put into place to deal with the numerous challenges.

*“This is a completely new budget, completely new budget. Look, if the original implementation would have been done properly, we would not have gone through this exercise. It had to be taken to the board, to receive the necessary approval and ask for resource to be available” SU4B.*

### 6.8.2 Allocate Adequate Resources

Adequate resources were sourced to ensure adequate representation of the organisation at the workgroups. Resources were sought to update the training materials and provide additional training as and when required. Operating units across all the different provinces were required to assign key resources to represent their respective units and regions at the national meetings. Influential regional representatives, who could understand the business and who would be able to communicate and impose their ideas and beliefs upon others when required, were sourced. The presence of dominant individuals in the workgroups was seen as a way of ensuring the regional concerns and requirements were adequately conveyed to executive management.

*“It is a combination of pushing and pulling people. You want to pull through the most influencing people from all the sections; so people who have the highest power and influence within the sections” SU3A.*

## 6.9 Discussion, Derived Propositions and Theoretical Elaboration

The organisation deployed numerous coping mechanisms to overcome its ERP implementation challenges in an attempt to minimise resistance and encourage use. Use of workaround solutions, workgroups and super-users, and change management initiatives such as retraining, support structures and reward incentives were used. The coping mechanisms were deployed to address the technical, knowledge and change challenges of the ERP solution. The subsequent sections generalise the key relationships between the ERP implementation challenges and coping mechanisms through the use of propositions.

*When an ERP implementation is plagued with numerous challenges and when resistance to change is high, enacting different coping mechanisms will enable an organisation to cope with the prevalent challenges.*

The literature on IT implementation, user resistance and coping theory corroborates these findings. Coping mechanisms are used by organisations to address their end-user problems and to minimise the threats posed by the implementation of IT solution (Benamati & Lederer, 2001; Beaudry and Pinsonneault, 2005; Calvert & Seddon, 2006; O'Donovan et al., 2010; Urus et al., 2011b). The chosen interventions, particularly rectification strategies, will have an impact on how resistance develops during the post-implementation phase (Rivard & Lapointe, 2012). Benamati and Lederer (2001) classify the coping mechanisms as either reactive or proactive. Education and training, endurance strategies (also referred to as workaround solutions), internal procedures such as customising initiatives, vendor and consultant support are identified as the most common coping mechanisms deployed by organisations. Other coping mechanisms refer to the use of knowledgeable user networks, also commonly referred to as subject matter experts, super-users or power-users, and helpdesk support (Calvert & Seddon, 2006; George, Iacono, & Kling, 1995; Robey et al., 2002; Volkoff et al., 2004). While ongoing training, support, use of super-users and customising are stated as long-term or proactive strategies, references to workarounds and use of other systems are categorised as short-term or reactive coping mechanisms (Benamati & Lederer, 2001; O'Donovan et al., 2010). Moreover, literature uncovers training

and education as the most popular and effective way to bridge ERP implementation challenges (Benamati & Lederer, 2001; Calvert & Seddon, 2006; O'Donovan et al., 2010; Onofrei et al., 2004; Skok & Legge, 2002).

### 6.9.1 Use of Workaround Solutions

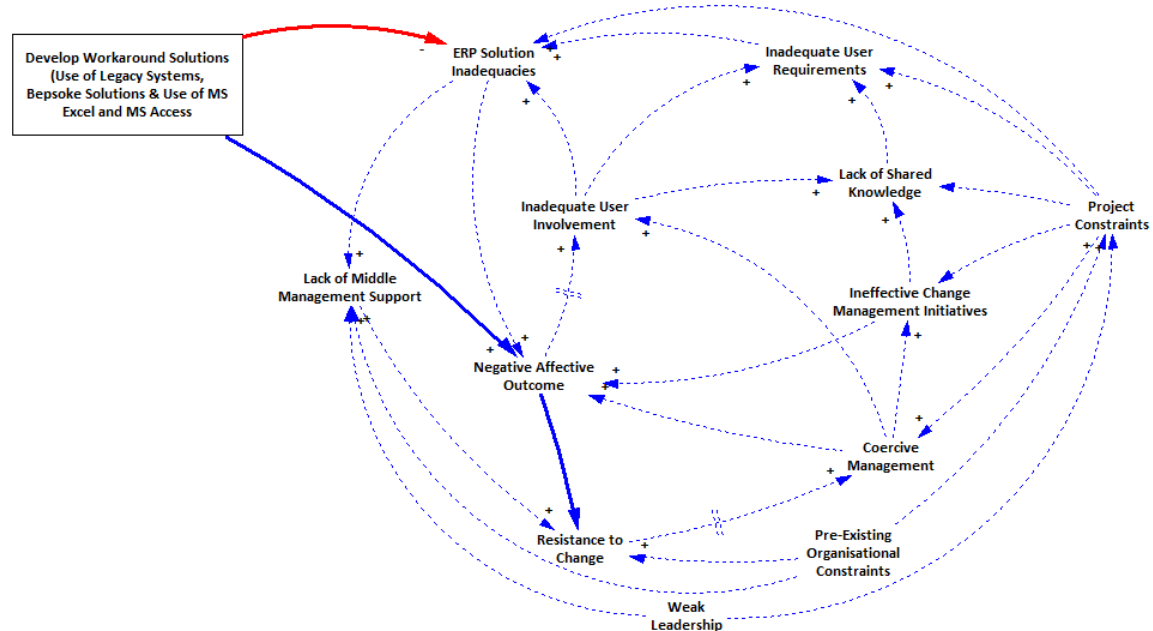


Figure 6-12: Impact of Workaround Solutions

The following propositions are derived:

*6A-1. When an ERP solution is perceived as inadequate, end-users will more likely use workaround solutions to cope with the inadequacies of the solution.*

Use of workaround solutions includes the continued usage of legacy solutions, bespoke solutions and third-party applications such as MS Excel and MS Access. As discussed in section 6.3, workaround solutions were employed to supplement the ERP solution in order to address the inadequacies of the ERP solution.

*6A-2. Use of workaround solutions to cope with the inadequacies of the solution increases the negative affective outcome and resistant behaviour of employees.*

While workaround solutions allow employees to cope with the inadequacies of the ERP solution, there is, however, no evidence to demonstrate that use of workaround solutions decreases the negative affective outcome of employees and resistant behaviour to ultimately increase use of the solution. On the contrary, use of workaround solutions increases the negative affective outcome and resistant behaviour of employees owing to the duplication of effort or use of easier alternatives. These findings are partially corroborated by the literature.

Use of workaround solutions and other systems or endurance strategies, as characterised by Benamati and Lederer (2001), is seen as a reactive strategy with numerous organisations relying on this solution post-implementation to cope with the limitations of their IT solution

(Benamati & Lederer, 2001; Kerr et al., 2007; O'Donovan et al., 2010; T. Urus et al., 2011), permitting the work to continue despite the encountered obstacles (Alter, 2014). *“Many workarounds occur because the available software and/or hardware lack specific functions or capabilities that are needed in order to perform specific work steps or to record specific data”* (Alter, 2014, p.1050). The literature also refers to workaround solutions as either shadow or feral systems. Workaround, feral or shadow systems are developed and used as coping mechanisms to deal with the limitations of the ERP solution (Behrens, 2009; Kerr et al., 2007; T. Urus et al., 2011) with the intention to either supplant or supplement the existing ERP solutions (T. Urus et al., 2011). Where the ERP solution lacks core functionalities which are required by the business, employees tend to fill the gaps through continued use of their legacy systems or through the use of other solutions. End-users can resort to use of MS Excel and MS Access, or can even choose to develop a comprehensive IS to overcome the experienced ERP solution limitations (Kerr et al., 2007; Kim et al., 2005; Urus et al., 2011b). However, in situations where the ERP solution is perceived as contributing to additional and unnecessary complexity to existing processes, employees will most likely replace the solution through the use of an alternate solution (Kerr et al., 2007).

### 6.9.2 Use of Workgroups

Numerous workgroups were put in place to address the inadequacies of the ERP solution and to bridge the change and knowledge challenges faced during the ERP implementation.

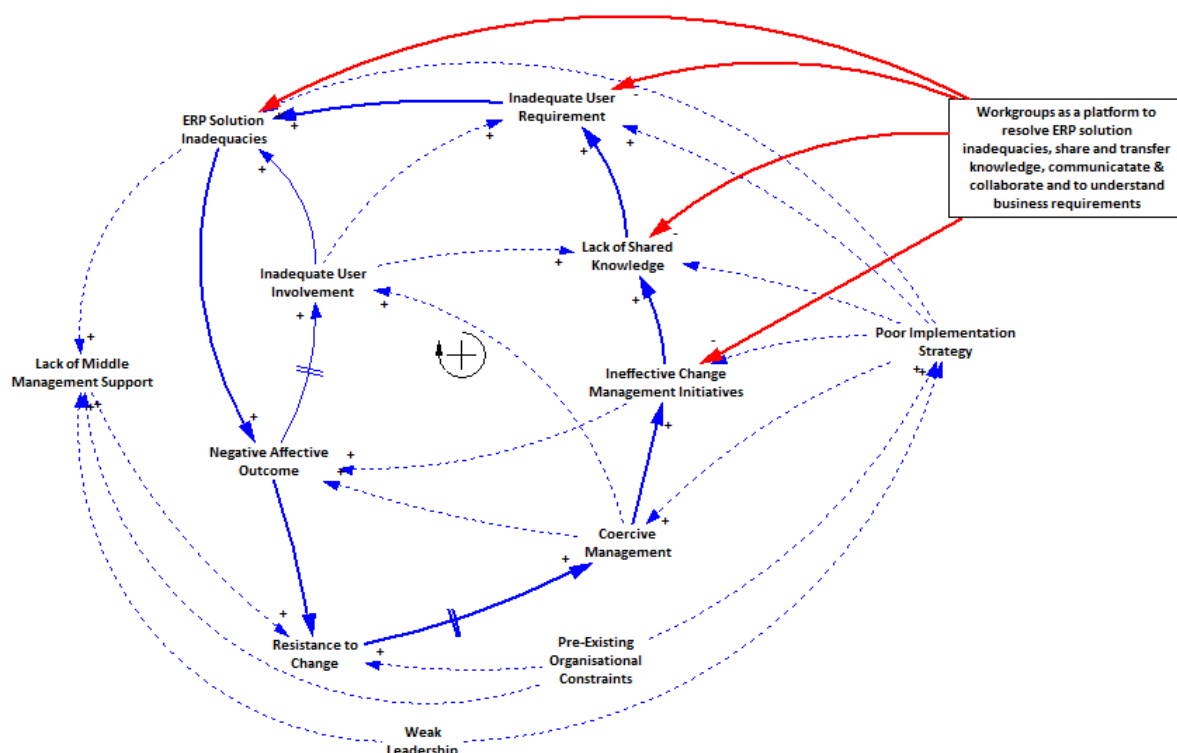


Figure 6-13: Impact of Workgroups

Use of workgroups allowed the organisation to reduce the lack of shared knowledge amongst stakeholders, allowing them to gain a shared understanding and knowledge of the business, whilst also opening up communication channels across the organisation business units. Workgroups also allowed stakeholders discuss key strategies on how to resolve some

of the existing inadequacies of the ERP solution. Through the findings, the following proposition can be drawn:

*6B-1. Workgroups enable stakeholders in a large, decentralised organisation to reach a shared understanding of the business requirements through communication, collaboration and knowledge strategies.*

These findings are corroborated to some extent in the literature. Use of workgroups is categorised as an effective way to share and transfer knowledge (Cummings, 2004), as workgroups enable an organisation to understand the different perspectives of different stakeholders while fostering a shared understanding of the organisational context through various means of interaction (Hackman, 1987). Knowledge transfer occurs through sharing of acquired experiences from one unit to the other or when “*a unit communicates with another unit about a practice that it has found to improve performance*” (Argote & Ingram, 2000, p.154). Moreover, the effectiveness of knowledge sharing is related to the diversity of the workgroups. Structurally diverse workgroups represented by members from different locations, business units, functional areas and reporting hierarchies enhance knowledge sharing and transfer as they benefit through various and unique knowledge sources (Cummings, 2004). Moreover, in the event where the formal trainings are deemed inadequate, use of workgroups become the primary source of knowledge and skills (Calvert & Seddon, 2006).

*6B-2 Workgroups enable an organisation to resolve its ERP solution inadequacies, whilst decreasing negative affective outcome and minimising resistance to change.*

The relationships between use of workgroups, ERP solution inadequacies, inadequate user requirement and ineffective change management initiatives have not been validated in the ERP implementation literature. The findings of this study, however, attribute use of workgroups as an effective mechanism to resolve these particular challenges, therefore adding to the body of knowledge on ERP implementation.

### 6.9.3 Use of Super-users

The introduction of super-users in the organisation was a means to acquire the involvement of the users as part of the post-implementation lifecycle.

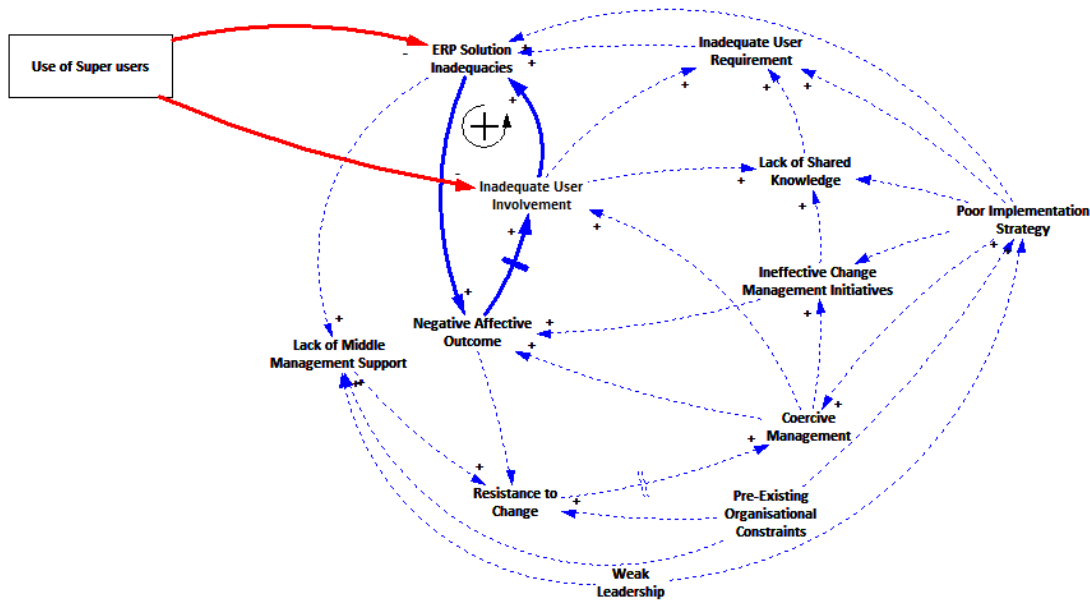


Figure 6-14: Impact of Super-users

Use of super-users from the different business units allowed the organisation to bridge the user gap, whilst enabling the organisation to resolve the numerous ERP solution inadequacies. Super-users were able to fix the data errors of ERP solution and were also responsible for ownership and testing of processes, leading to a decrease in perceived inadequacies of the ERP solution. The resulting consequence can have a mitigating effect on the emphasised reinforcing loops as reflected in Figure 6-14. The following proposition is derived.

*6C-1. In a large, decentralised organisation, the use of super-users bridges the user gap, whilst enabling the organisation to resolve its ERP solution inadequacies.*

In the context of this research, a user gap is defined as the disconnect between end-users' vs. managerial's expectations of the ERP solution, that arose from the lack of end-users' involvement as part of the implementation. Setting up a group of super-users comprising of representatives from different functional units and IS specialists has been identified as an effective way to ensure adequate user involvement (Al-Mashari & Al-Mudimigh, 2003; Alshawi et al., 2004; Somers & Nelson, 2004). As part of the implementation team, super-users have to act as intermediaries between end-users and the implementation team in an attempt to reconcile any differences between the two groups (Volkoff et al., 2004). The extent of involvement of super-users in the implementation lifecycle varies. The implementation team may choose to involve super-users prior to the start of the organisational wide trainings. Super-users are first trained as trainers; thereafter they are expected to train end-users throughout the organisation whilst eventually becoming the primary support of the users. Alternatively, super-users can be involved in the early stages of the pre-implementation cycle where the super-users become part of the implementation team (Volkoff et al., 2004). In this particular research, despite the involvement of the super-

users only in the later stages of the implementation, they played a key role in ensuring the resolution of numerous ERP implementation challenges.

#### 6.9.4 Use of Super-users and Change Management Initiatives

Deployment of super-users, in conjunction with change initiatives, allowed stakeholders to improve their shared understanding through collaboration, communication and knowledge sharing strategies.

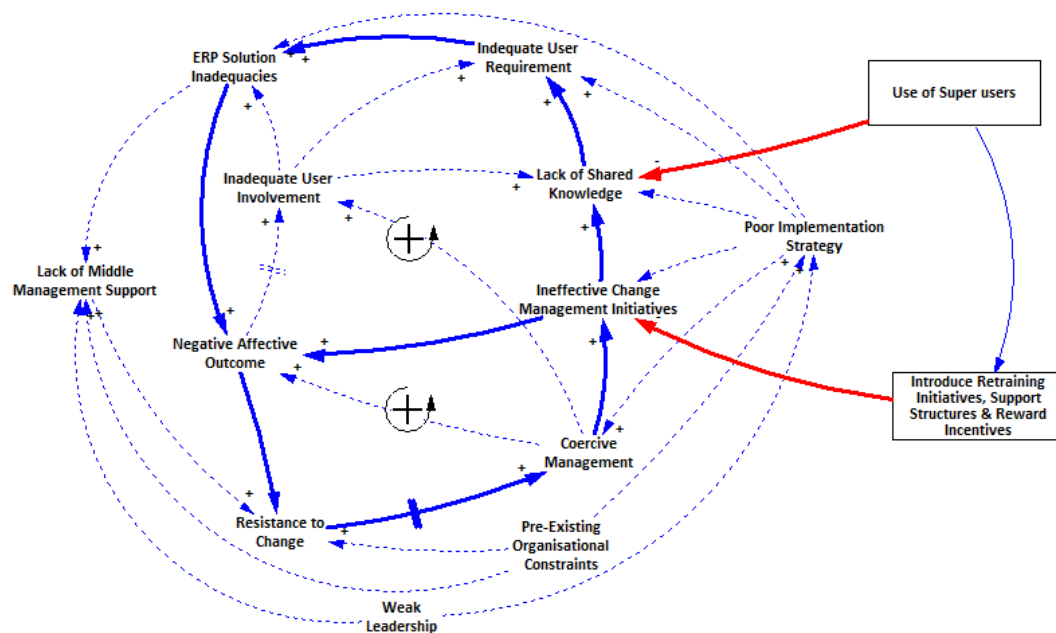


Figure 6-15: Impact of Super-users and Change Management Initiatives

As representatives of different functional areas and owing to their involvement with consultants, senior management and end-users, super-users were also able to provide end-users with the required support and education to bridge the prevalent knowledge gap between the different stakeholders. Retraining initiatives and support structures introduced as part of a more effective change management initiative provided end-users with the required support that was previously lacking. The resulting consequence eventually leads to a decrease in the exhibited negative affective outcome and resistant behaviour. Therefore, the following proposition is drawn:

*6C-2. The deployment of super-users and change management initiatives such as training and support leads to an increase in shared knowledge and understanding of the solution whilst minimising their negative affective outcome and resistant behaviour.*

Owing to their interaction with consultants and expert knowledge of business processes, super-users, ultimately, qualify as in-house ERP experts and are expected to disseminate their knowledge to support end-users in numerous ways (Calvert & Seddon, 2006; Volkoff et al., 2004). In most cases, super-users are required to provide the required end-user training and they can even be responsible for creating training materials (Skok & Legge, 2002). Other tasks assigned to super-users may include testing, process ownership, and providing first

line of support and distribution of key information such as information updates and hot tips (Calvert & Seddon, 2006; Volkoff et al., 2004). Through the ongoing support of super-users, end-users' ability to understand the ERP solution increases, leading to an eventual positive influence on their cognitive and affective behaviour (Amoako-Gyampah, 2007; Calvert & Seddon, 2006).

## 6.10 Summary of Findings

This chapter explores the different coping mechanisms employed by the organisation to cope with the different ERP implementation challenges. Use of workaround solutions, workgroups, super-users, retraining initiatives, support structures and reward incentives have been highlighted as key coping mechanisms used by the organisation. These coping mechanisms are enabled through the support of middle management and project management initiatives. Arguably, the core objective of deploying coping mechanisms is to minimise resistant behaviour. The findings of this study, however, depict that, in effect, coping mechanisms can also amplify resistant behaviour. This has been exemplified through the use of workaround solutions.



## 7 Conclusion

The final chapter of this study summarises this research and provides closing remarks to conclude the thesis. To begin with, the research problem and research questions are revisited. The research methodology is then summarised, portraying the rigorous scientific approach undertaken. Subsequently, the research findings are synthesised and summarised to affirm the relevance of this study. Thereafter, the research contributions, limitations and future research opportunities are discussed, marking the completion of the thesis.

### 7.1 Rationale of Study, Problem Statement Research Questions

Implementing an ERP system is perceived as a multifaceted project which exposes organisations to numerous challenges owing to the complexity involved (Kumar et al., 2003). Organisations continue to struggle in their implementation efforts, as evidenced by the high failure rate of ERP implementations (Chen et al., 2009; Kumar et al., 2003; Kwahk & Lee, 2008; Momoh et al., 2010; Panorama Consulting, 2016). In spite of the numerous studies conducted in ERP implementation sphere, scholars are yet to reach a unified stance with regard to the general applicability of CSFs and CFFs encompassed in ERP implementations. These conflicting views originate as a consequence of the unique organisational conditions pertinent to each organisation. Owing to the fact that the majority of ERP implementation researches originate from developed countries, the significance of these findings and application to emerging and developing economies remain dubious (Hong & Kim, 2002; Soh et al., 2000). With the upsurge in ERP implementations in organisations, the lack of research in emerging and developing countries cannot be disregarded (Ngai et al., 2008). Another prevalent research concern is the lack of focus on the dynamic implementation process and the systemic interaction of the ERP implementation variables (Akkermans & van Helden, 2002; Venugopal & Rao, 2011).

This study therefore addresses these persistent research concerns through the following research questions.

- RQ1: What are the major challenges faced by public organisations when implementing an ERP system?
- RQ2: How do the identified ERP implementation challenges interact with each other from a systemic perspective?
- RQ3: How can organisations overcome their ERP implementation challenges through the use of coping mechanisms?

### 7.2 Research Methodology

The research questions were addressed through an inductive and interpretive approach and qualitative research methods. The use of case studies was ideal for this research context which seeks to explain the dynamic and systemic interplay of the implementation challenges and how organisations overcome ERP implementation challenges through the use of different coping mechanisms. The selection of two case studies within one large

organisation formed the basis for cross-case comparisons and analysis whilst aiding towards the holistic understanding of the phenomenon of interest.

Data collection was achieved by means of semi-structured interviews through the engagement of end-users, support-users and managerial employees. The focus on different categories of stakeholders allowed the researcher to gain richer, deeper insights and multiple viewpoints of employees' experiences. Triangulation through documentary evidence and observation guaranteed credibility and completeness of the data. The interviews began with participants from the forecasting unit who had just undergone the ERP training at that stage, and were expected to be conversant and engaged with the new SAP solution. However, in spite of completing the training, employees did not end up using SAP PPM. In contrast, participants from the implementation unit espoused both SAP PPM and cProjects following the training sessions, albeit for only a brief period of time. Eventually, SAP cProjects was scrapped while usage of SAP PPM was limited.

Different data analysis approaches allowed the researcher to achieve analytical rigour. The ERP implementation challenges and the associated coping mechanisms were unveiled and analysed through thematic and constant comparative analysis. The dynamic and systemic interplay between the different ERP implementation challenges were examined through system dynamics and causal loop modelling.

### 7.3 ERP Implementation Challenges

Chapter four unveils the ERP implementation challenges by answering the first research question reaffirmed in section 7.1. Participants from both cases described the numerous challenges they were confronted with during the implementation cycle. The analysis yielded 27 meso-level challenges which were condensed into six core categories. A taxonomic classification consisting of organisational, management, project management, change management, technical and knowledge challenges was developed, as depicted in Figure 7-1.

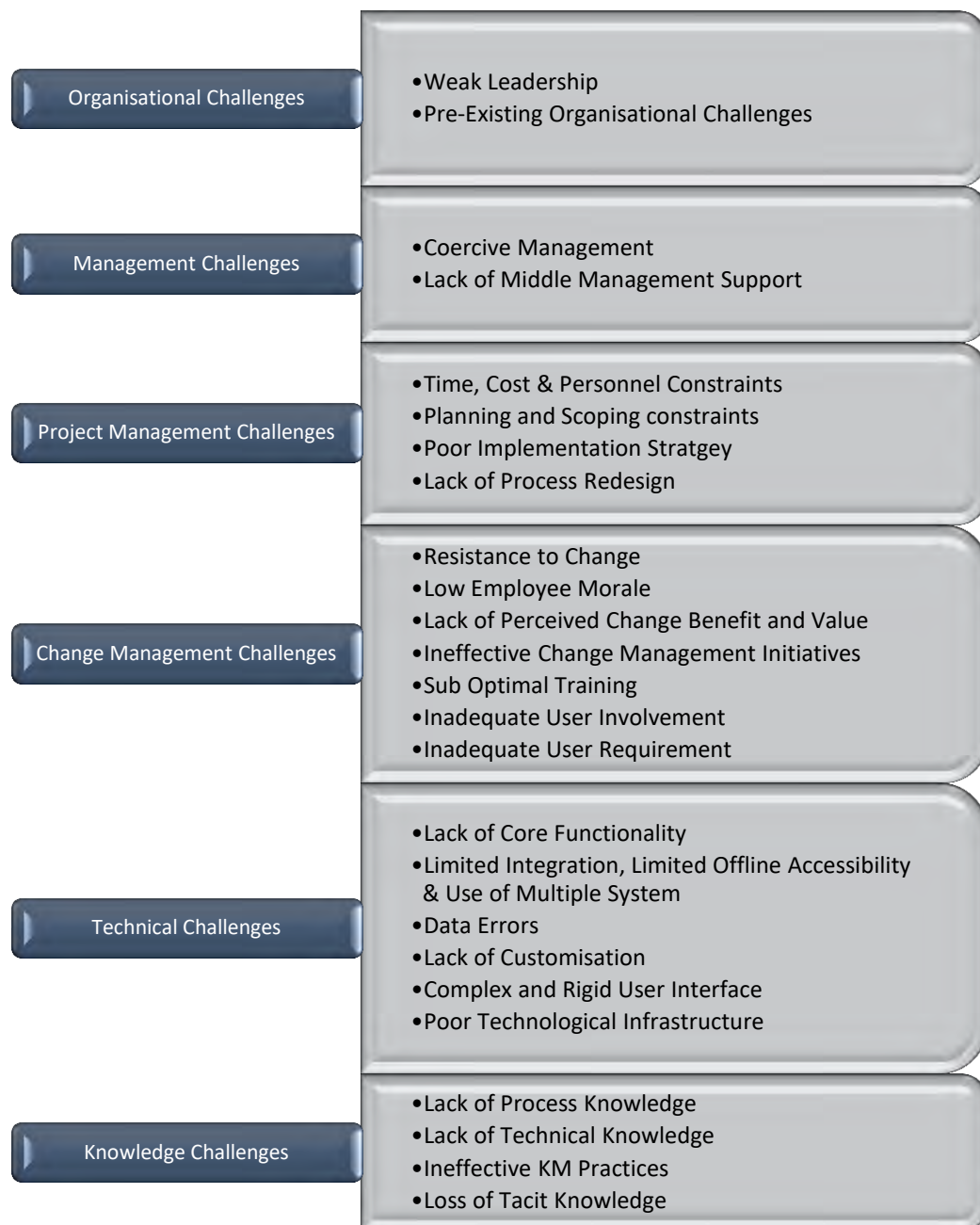


Figure 7-1: Taxonomy of ERP Implementation Challenges

With respect to the occurrence of the ERP implementation challenges, the most prevalent challenges as per the empirical observations originated from the change management category with technical challenges, project management, management, knowledge and organisational challenges following suit respectively. The majority of the unveiled challenges were prevalent in both cases. The key difference was noticeable at middle management level. While middle management from case B wielded their power on the users to ensure compliance, despite the users' initial reticence to use the solution, middle management from case A displayed their contempt for the solution by supporting the users in their disengagement to the use of the solution.

## 7.4 Dynamic and Systemic Interplay of the ERP implementation Challenges

In chapter 5, the dynamic and systemic interplay of the ERP implementation were depicted through the use of system dynamics and causal loop modelling. Through co-occurrence analysis, the dominant challenges were identified. Based on their dominance and relationship behaviour, the 27 meso-level challenges were refined into 12 meta-themes. Key causal relationships between the ensuing 12 meta-challenges were thoroughly analysed and discussed. Figure 7-2 portrays the conceptual model depicting the dynamic systemic interplay of the ERP implementation challenges.

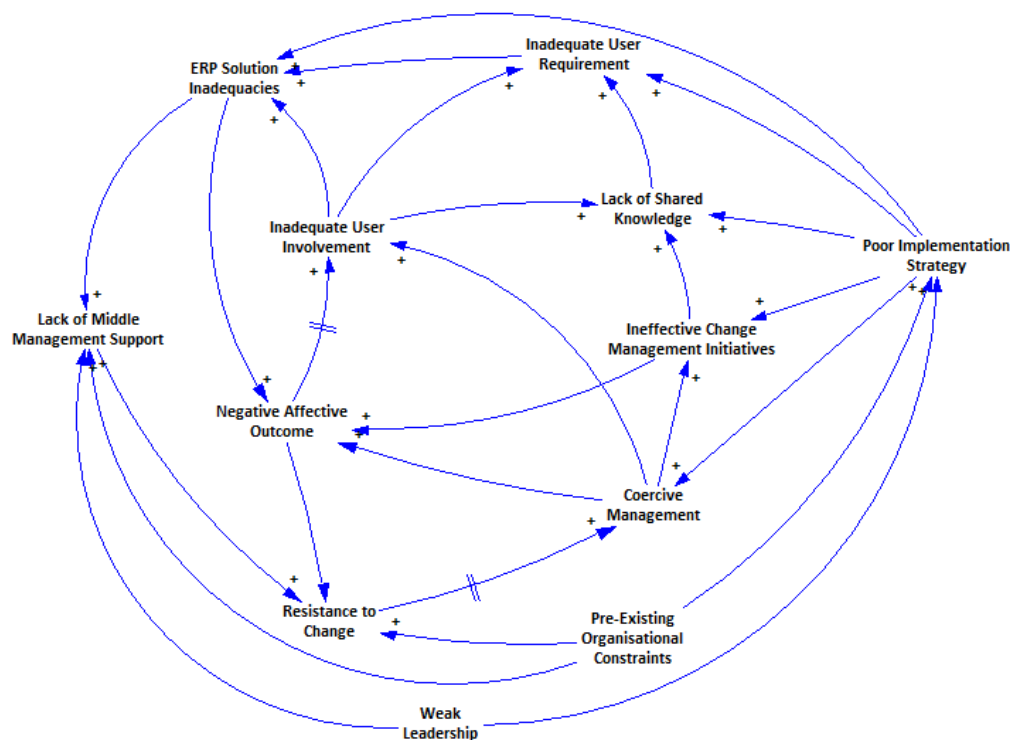


Figure 7-2: A Systemic View of the ERP implementation Challenges

The proposed theoretical model emphasises that organisational challenges and project challenges are predominantly the root cause of the ensuing ERP implementation challenges.

Pre-existing organisational constraints and weak leadership lead to poor implementation strategy. Executive management's failure to inculcate a clear and shared change vision was the forerunner to a poor implementation strategy. In an attempt to vie for external funding, the organisation, without considering the pre-existing financial constraints, proceeded in a rushed implementation strategy, as depicted by the relationship between the pre-existing organisational challenges and poor implementation strategy.

Additionally, the lack of uniform practices from each business unit, coupled with the organisation's paradoxical approach to standardise the *modus operandi*, resulted in a lack of middle management support and increased resistant behaviour. The following propositions are put forward.

*Table 7-1: Derived Propositions Depicting the Impact of Organisational Challenges*

When an organisation faces existing organisational constraints and yet chooses to undertake a large-scale ERP implementation, the project will be plagued by a poor implementation strategy.
When weak leadership prevails in an organisation and yet the organisation undertakes a large-scale ERP implementation, the project will be plagued by a poor implementation strategy.
When weak leadership and pre-existing organisation challenges prevail in an organisation and yet the organisation undertakes a large-scale ERP implementation without seeking middle management's buy-in, middle management will deploy different tactics to express their lack of support.
When a weak organisational culture prevails due to the lack of uniform practices and yet an organisation chooses to undertake a large-scale ERP implementation, employees will exhibit resistant behaviour.

The findings also emphasise the negative impact of poor implementation strategy on change management initiatives, shared knowledge practices, user requirement and the ERP solution itself. Moreover, in an attempt to substantiate the budget allocated and spent on the ERP implementation, employees were coerced into using a sub-standard solution, as illustrated by the relationship between poor implementation strategy and coercive management. The following propositions are put forward.

*Table 7-2: Derived Propositions Depicting the Impact of a Poor Implementation Strategy*

When an ERP implementation is plagued by a poor implementation strategy, the project team will more likely deploy ineffective change management strategies.
When an ERP implementation is plagued by a poor implementation strategy, the project team will more likely deploy ineffective knowledge management mechanisms, leading to a lack of shared knowledge amongst different stakeholders.
When an ERP implementation is plagued by a poor implementation strategy, the project team will place less emphasis on drawing adequate user requirements.
When an ERP implementation is plagued by a poor implementation strategy, the scope of the proposed scope of the ERP solution will be compromised, resulting in an inadequate ERP solution.

The interrelationships of the remaining ERP implementation challenges were analysed through feedback loops and time delays. Figure 7-3 illustrates five core loops. While additional loops could have been derived from the model, the five loops were deemed sufficient to understand the interrelated nature of the ERP implementation challenges. The designated feedback loops denote that challenges reinforce each other in the same direction, forming, in this specific study, vicious cycles. Vicious cycles, as opposed to virtuous cycles, have the negative effect of intensifying the impact of the ERP implementation challenges, signalling the downward spiral leading to the non-use of the ERP solution in the organisation. The findings were then generalised through the use of

propositions. Corroborating evidence to warrant the propositions was then drawn from the literature. The feedback loops and propositions are summarised in the subsequent sections.

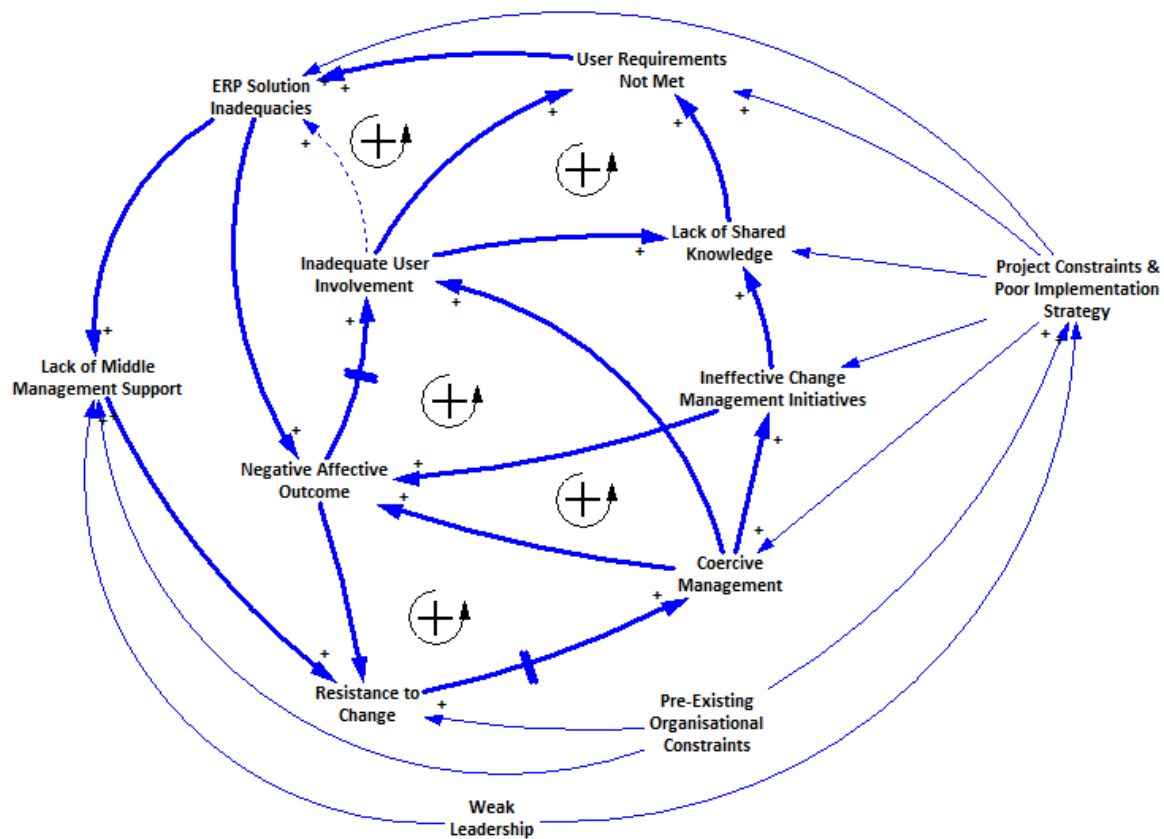


Figure 7-3: Causal Model Depicting Dynamic Interplay of ERP Implementation Challenges

#### Loop One: The dynamic interplay between negative affective outcome, resistance to change and coercive management

Employees did not associate any benefit to the implementation and exhibited a low morale, leading to a resistant behaviour. In an attempt to minimise resistance behaviour, the organisation resorted to the use of coercive measures to force the employees to use the ERP solution. Use of coercive measures further demotivated the employees who in turn exhibited further resistance.

Table 7-3: Derived Propositions from Loop One

Employees exhibiting negative affective outcome towards an implemented ERP solution will be more averse to the change and will depict resistant behaviour.

When management resorts to use of coercive measures to overcome resistance to the ERP solution, the negative affective outcome will intensify, and greater negative affective outcome will amplify resistant behaviour.

### Loop Two: The dynamic interplay between ineffective change management initiatives, negative affective outcome, resistance to change and coercive management

The ineffective change management initiatives exemplified by communication breakdowns, sub-optimal training and inadequate support structures gave rise to a negative affective outcome displayed by employees. The latter did not perceive any associated benefit to the change, leading to a resistant behaviour, further amplifying management's use of coercive measures.

*Table 7-4: Derived Proposition from Loop Two*

When end-users perceive change management initiatives as ineffective, they will more likely exhibit a negative affective outcome, amplifying resistant behaviour.
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### Loop Three: The dynamic interplay between inadequate user involvement, inadequate user requirement, ERP solution inadequacies and negative affective outcome

The limited end-users' involvement during the initial implementation phase led to inadequate user requirements, resulting in an inadequate ERP solution. The inadequacies of the ERP solution led to a negative affective outcome on behalf of employees who did not associate any benefit with the ERP solution. Consequently, they displayed reluctance to participate in any subsequent iterations which required their input.

*Table 7-5: Derived Propositions from Loop Three*

Inadequate user involvement during the different stages of an ERP solution will give rise to inaccurate and incomplete user requirements which, in turn, will negatively impact the implemented ERP solution.
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When an ERP solution is perceived as inadequate due to incomplete and inaccurate user requirements, employees will exhibit a negative affective outcome.
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A negative affective outcome will lead to employees' aversion to participate in any subsequent enhancements of the ERP solution.
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### Loops Four and Five: The dynamic interplay between coercive management, ineffective change management initiatives, inadequate user involvement, lack of shared knowledge, inadequate user requirement, ERP solution inadequacies, lack of middle management support and resistance to change

This loop depicts the complex interplay between the management, change, knowledge challenges and technical challenges and, as discussed in chapter 5, can be spilt into two smaller loops. Due to the organisation's reliance on coercive measures to force employees to abide by the ERP solution, little emphasis was placed on user involvement and effective change management practices, leading to a lack of shared knowledge amongst different stakeholders and to incomplete and inaccurate user requirements. The ensuing consequence contributed to the experienced inadequacies of the ERP solution, leading to middle management's lack of support towards the implementation. Management's lack of support stimulated a resistant behaviour which forced the organisation to further deploy coercive pressure, not only towards active users of the system, but also towards middle management.

*Table 7-6: Derived Propositions from Loops Four and Five*

When organisations choose to use coercive pressure to force usage of an ERP solution, effective change management initiatives and adequate user involvement will most likely be overlooked.
Ineffective change management initiatives and low user involvement result in a lack of shared knowledge amongst different stakeholders which, in turn, will result in incomplete and inaccurate user requirements.
When an ERP solution is perceived as inadequate, middle management will more likely not support the initiative, thereby stimulating a resistant behaviour throughout the lower echelons.
When employees exhibit resistant behaviour, executive management will more likely use coercive pressure to force usage of the ERP solution.

#### 7.4.1 Coping Mechanisms

Chapter 6 introduces the different mechanisms utilised by the organisation to overcome the prevailing ERP implementation challenges. The coping mechanisms were first analysed and described through thematic analysis. The relationships between the ERP implementation challenges and the identified coping mechanisms were uncovered through co-occurrence analysis, leading to the final conceptual model illustrated in Figure 7-4. The chapter concludes with derived propositions and corroborating evidence from the literature.





According to Akkermans and van Helden (2002), the presence of vicious cycles can be mitigated through counter measures. While such measures and coping mechanisms can be effective in minimising the adverse effects, they are, however, considered as a reactive, time-consuming strategy. In so doing, organisations shift their focus to short-term goals at the expense of long-term ones and risk the possibility of losing track of the latter, therefore jeopardising the project. The identified coping mechanisms can also be compared to the disturbance handling strategies discussed by Beaudry and Pinsonneault (2005). Successful strategies can minimise the negative consequences of the IT solution and restore end-users' emotional stability (Beaudry & Pinsonneault, 2005).

In the context of this research, deployment of workaround solutions, super-users, workgroups and change management initiatives were the prime coping mechanisms adopted to overcome the ERP implementation challenges. The effective use of workgroups, super-users and change initiatives had the desired effect of curtailing the prevailing negative affective outcome and resistant behaviour. Conflicting evidence was uncovered for the deployment of workaround solutions which increased the negative affective outcome towards the ERP solution and led to an increase in resistant behaviour. The following propositions are derived.

*Table 7-7: Derived Propositions Depicting the Effect of Coping Mechanisms*

When an ERP implementation is plagued with numerous challenges and when resistance to change is high, enacting different coping mechanisms will enable an organisation to cope with the prevalent challenges.
When an ERP solution is perceived as inadequate, end-users will more likely use workaround solutions to cope with the inadequacies of the solution.
Use of workaround solutions to cope with the inadequacies of the solution increases the negative affective outcome and resistant behaviour of employees.
Workgroups enable stakeholders in a large, decentralised organisation to reach a shared understanding of the business requirements through communication, collaboration and knowledge strategies.
Workgroups enable an organisation to resolve its ERP solution inadequacies, whilst decreasing negative affective outcome and minimising resistance to change.
In a large, decentralised organisation, the use of super-users bridges the user gap, whilst enabling the organisation to resolve its ERP solution inadequacies.
The deployment of super-users and change management initiatives such as training and support leads to an increase in shared knowledge and understanding of the solution whilst minimising their negative affective outcome and resistant behaviour.

While the deployment of most coping mechanisms in effect brought positive contributions to alleviate some of the challenges raised, it did come at the expense of additional budget and resources and necessitated extra managerial assistance.

## 7.5 Research Contribution

This section evaluates the research contribution of this study. The relevance of this research is evaluated in terms of theoretical, methodological and practical contributions.

### 7.5.1 Theoretical Contributions

This research makes several theoretical contributions to the ERP implementation literature. The empirical findings of this research have been generalised to provide both descriptive and explanatory theories as defined by Gregor (2006), whilst drawing specific implications and rich insights on the phenomenon of interest (Walsham, 1995).

The proposed taxonomy provides a descriptive theory for analysing the different ERP implementation challenges faced by large, decentralised, public organisations. Descriptive theories, according to Gregor (2006), seek to describe and categorise entities and are the precursors to the development of other types of theories (Gregor, 2006). Classification theories, derived from the former, usually include typologies, taxonomies and frameworks (Gregor, 2006; Mintzberg, 2005). In this particular research, the taxonomy developed closes some existing gaps in the ERP implementation literature, by providing an exhaustive list of ERP implementation challenges organisations are likely to face during the different stages of their implementation lifecycle. The results of this research can provide valuable insights and can be generalised to large, decentralised organisations in emerging economies, given the context in which the study was undertaken.

The main research contribution of this research is, primarily, the model put forth to explain the dynamic and systemic interplay of the ERP implementation challenges presented in chapter 5. The proposed conceptual model, through the use of causal loop modelling, provides an explanatory theory to understand the interrelated nature and causality of the ERP implementation process. The developed theory bridges a fundamental knowledge gap by proposing a systemic model portraying how the complex interactions of ERP implementation challenges influence the implementation outcome, whilst offering rich insights into the dynamic nature of an implementation process through the application of systemic tools. Specific implications, based on the identified feedback loops, were formulated to form theoretical propositions as principles of explanation and understanding, forming the basis of the generation of new knowledge in the context of ERP implementations.

Further contribution of this research includes the analysis and explanation of coping mechanisms that can help organisations alleviate their ERP implementation challenges. The use of workgroups, super-users and workaround solutions provide valuable insights of the mechanisms organisations could, potentially, employ in order to overcome the implementation challenges encountered; hence, provide an advancement and novel contribution to the existing ERP implementation body of knowledge, through a set of theoretical propositions.

### 7.5.2 Methodological Contributions

An inductive approach was adopted and revealed valuable breakthroughs into ERP implementation challenges affecting large organisations. Identification of ERP implementation challenges through an inductive approach, in tandem with the use of systems thinking as a lens to identify and assess ERP implementation challenges, presents a novel perspective to study the complex dynamics of an implementation process. Literature highlights a limited number of studies undertaken to understand the dynamics of ERP

implementation using a systemic approach. Akkermans and van Helden (2002), through their study, shed a new light on the dynamic ERP implementation process and warrant the suitability and usefulness of the applicability of this particular method.

Furthermore, causal loop modelling provides a rigorous method to identify the inter-relations of ERP implementation challenges, revealing emergent facets and indiscernible interplays previously overlooked. This study, therefore, sets the benchmark for future systemic research undertaken in the field of ERP implementations.

Moreover, the use of co-occurrence analysis to uncover the underlying relationships between the different ERP implementation challenges is a valuable contribution. Use of co-occurrence analysis allowed the researcher to gain rich insights into the strength of the relationships between the different ERP implementation challenges and the frequency of their occurrence.

### 7.5.3 Practical Contributions

From a practical perspective, this research provides several significant contributions to large, decentralised organisations implementing standardised ERP solutions. While the research findings would be more applicable to large public sectors, there are key outcomes that would be relevant to large private sectors. To begin with, the research unveils an exhaustive list of the ERP implementation challenges which large organisations need to contemplate prior to and during their ERP implementations.

The research offers organisations a comprehensive narration of the systemic nature of the ERP implementation challenges and the different coping mechanisms that could potentially be implemented to address or alleviate these ERP implementation challenges. This narration could be useful in identifying the root causes of ERP implementation bottlenecks within large organisations in emerging economies.

A set of guidelines is put forth:

1. Prior to undertaking ERP implementations, a thorough investigation of the current environment and existing problems needs to be carried out. An understanding of the consequences of the existing organisational challenges would help facilitate decision-making with regard to actions that need to be implemented to address those concerns.
2. In large, decentralised organisations with weak organisational culture, the lack of uniform practices would most likely be prevalent. Measures need to be put forth to overcome the cultural barriers to reach a standard and shared ethos before proceeding with the implementation.
3. Additionally, organisations opting for a standardised ERP solution should consider that a standardised ERP solution does not guarantee an optimal process. Prior to the implementation, organisations are required to undertake a business process re-engineering exercise to, initially, identify the optimal process to be automated by the ERP solution.

4. The planning phase should not be compromised. Organisations need to invest in considerable resources in order to establish comprehensive project and risk management plans in order to avoid a poor implementation execution.
5. Organisations should not underestimate the significance of change management initiatives. Organisations should ensure that they have set up open and frequent communication channels and adequate support structures to support their employees. Organisations should carefully assess the training needs of their employees and guarantee that an optimal environment, based on the live environment, is replicated. Moreover, organisations should ensure employees are allocated ample time to be accustomed to the ERP solution. In conjunction, establishment of a central support team and super-users would help support and train employees during the transition period.
6. Employees, especially future users of the system should be incentivised and reward and recognition programmes need to be allocated in the budget. This would ensure adequate user participation from all the different business units which will be impacted by the change. Use of super-users to represent end-users and various business units can be an effective strategy to ensure adequate user representation.
7. A shared platform and adequate interaction time should be allocated to consultants and selected internal representatives or super-users so as to maximise effective dissemination of knowledge, both internal and technical, thus leading to a more complete set of user requirements.
8. Effective organisation-wide knowledge-sharing and transfer mechanisms are necessitated to actively discuss concerns and reach a shared understanding of requirements across the silos in large, decentralised organisations. Particularly, when an organisation does not share a standard practice across its different decentralised units, use of workgroups can leverage the disharmonies of interest at the onset of the implementation lifecycle.
9. During the roll-out phase, users of the system must be provided with an effective and direct means to escalate any technical challenges encountered or to request assistance. This ensures immediate resolution of issues as well as mitigates frustrations that may result.
10. As opposed to use of coercive measures to drive usage of an ERP solution in response to the prevalent organisational resistance, organisations should, instead, focus on implementing change management initiatives, as early as possible, into the project, to curb any negative and resistant behaviour.

## 7.6 Limitations and Future Research

The identified research limitations of this study lead to potential new research opportunities. One of the main limitations of this research concerns the restraint focus on solely three categories of stakeholders, namely, end-users, support-users and managerial employees. Several attempts to engage with the higher hierarchies encompassing the steering committee members and executive management were made, to which the author did not receive any acknowledgement. As a consequence, the ERP implementation

challenges mostly reflect the difficulties encountered from the perspective of employees from mid-management level and below. The interaction with the end-users, support-users and managerial staff involved in key facets of the ERP implementation provided a wealth of information related to processes and challenges experienced by active users of the system. However, from a strategic management perspective, justifications for the strategies deployed were limited. Future research could, therefore, target participants from the executive and project committee, to gain richer insights into the organisational and project challenges and the decision-making processes that affect the ERP implementation process.

While this research offers numerous practical contributions as discussed in section 7.5.3, the significance of the recommendations can only be achieved through collaboration and engagement with the industry. ERP practitioners need to be cognisant of these recommendations. Therefore, as a first step, these findings should be integrated in the case organisation. Follow-up meetings were arranged with key participants to share and discuss the findings of this study. Alternatively, future research could use action research as a methodology to validate the findings of this study and to maintain a closer engagement with ERP practitioners for theory to inform practice and vice versa.

In the context of this research, due to limitations in the scope, coping mechanisms were assumed to be stimuli-distinct and external to the system. In reality, these coping mechanisms are reliant on feedback from the internal system and, as such, the effectiveness of these mechanisms is inherently dependent on the state of the system, therefore, resulting in a limitation to this research. Future research could aim at investigating the causal effect of the overall system whilst integrating the coping mechanisms.

Moreover, cultural challenges, the resistant organisational culture and lack of uniform practices between the different business units were uncovered as prominent factors that impact the ERP implementation. However, thorough investigation of the different cultural idiosyncrasies was beyond the scope of this study. Future studies could, potentially, examine the impact of different multi-cultural segments and user-bases within organisations with weak organisational culture.

The final limitation identified is inherent to the interpretive case study approach adopted for this research. This particular study focused on two different cases within the same organisation. The case organisation can be classified as a large, decentralised, South African, public sector organisation. While the findings of the study can be largely generalised to large, decentralised organisations, there are key elements which are unique to its contextual settings. For instance, the pre-existing financial condition which led to the implementation of the ERP solution can be characterised as peculiar to private sectors, though its significance in the public sector domain cannot be ignored. Similarly, poor technological infrastructure and the numerous training challenges faced by the organisation are predominantly challenges experienced by emerging economies, as previously underlined by Soja (2011) and Wong et al. (2005). Future studies could extend, based on this study, to explore ERP implementation challenges and coping mechanisms in a private sector, to unearth the underlying commonalities and discords between public and private sectors.

## 7.7 Concluding Remarks

This chapter concludes the thesis titled: *A systemic analysis of ERP Implementation Challenges and Coping Mechanisms: The case of a large, decentralised, public organisation in South Africa*. The research questions were revisited and a synopsis of the research findings was presented. This research, ultimately, attempts to understand the ERP implementation challenges affecting large, decentralised organisations and the coping mechanisms used to surmount the challenges. The main research contributions, underpinning the originality of this research, offer rich insights into the systemic nature of ERP implementation challenges. The presented model epitomises an explanatory theory, allowing researchers to theorise the different scenarios that can influence the implementation process. Additional knowledge claims have been stated as part of the theoretical, methodological and practical contributions.

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## 9 Appendices

### 9.1 ERP Implementation lifecycle

Articles	Stages in life cycle					
Al Mashari et al. [2003]	Setting up	Implementation	Production			
Berchet and Habchi [2005]	Selection	Deployment and Integration		Stabilization	Progression	Cyclism
Bernroider and Lössner [2003]	Candidature	Evaluation	Implementation	Stabilization	Use & Maintenance	Extinction
Chang [2004]	Planning	Design and build	Testing	Implementation	Knowledge	Up and running
Esteves and Pastor [2001]	Adoption decision	Acquisition	Implementation	Use & Maintenance	Evolution	Replacement phase
Esteves and Pastor [2005]	Preparation	Blueprint	Realisation	Final preparation	Ongoing help & Support	
Guang-hui et al. [2006]	Preprojecting	Execution	Stabilization	Assessing		
Hawking et al. [2004]	Planning	Build	Go live	Stabilize	Optimize	Optimize
Ibrahim et al. [2008]	Feasibility	Planning	Package Selection & Pre implementation	Implementation	Post implementation	
Loh and Koh [2004]	Preparation	Implementation	Maintenance			
Markus and Tanis [2000]	Characterize	Project	Stabilization	Unplanned maintenance		
Motiwala and Thompson [2009]	Planning	Implementation	Stabilization	Backlog	Automation	Major upgrade
Motwani et al. [2005]	Pre implementation	Implementation	Post implementation and evaluation			
O'Leary [2000]	Decision for ERP	ERP Selection	Design of ERP	Implementation	Now going alive	Training
Parr and Shanks [2000]	Planning	Project	Implementation			
Rajagopal [2002]	Initiation	Adoption	Adaptation	Acceptance	Reorientation	Discontinuation
Ross and Vitale [2000]	Design	Implementation	Stabilization	Technical implementation		
Shanks et al. [2000]	Planning	Implementation	Stabilizing	Implementation		
Somers and Nelson [2001]	Initiation	Adoption	Adaptation	Acceptance	Consolidation	Discontinuation
Stefanus [2001]	Business vision	ERP selection	Implementation	Use, maintenance and evolution		
Sunmer [2000]	Planning	Analysis	Design	Implementation	Integration	Maintenance

Figure 9-1: Different Implementation Models Used in the Literature (Shaul and Tauber, 2013)

## 9.2 Identified CSFs along the ERP implementation lifecycle

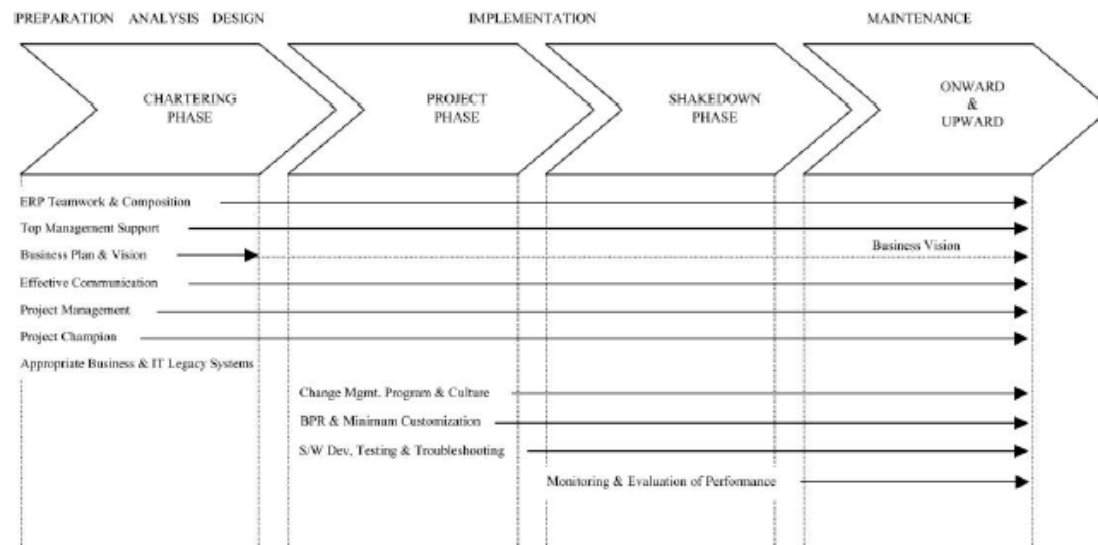


Figure 9-2: CSFs Along the ERP Implementation Lifecycle (Markus and Tanis, 2000 as cited in Nah et al., 2001)

## 9.3 CSFs vs CFFs

### 9.3.1 Taxonomy of CSFs

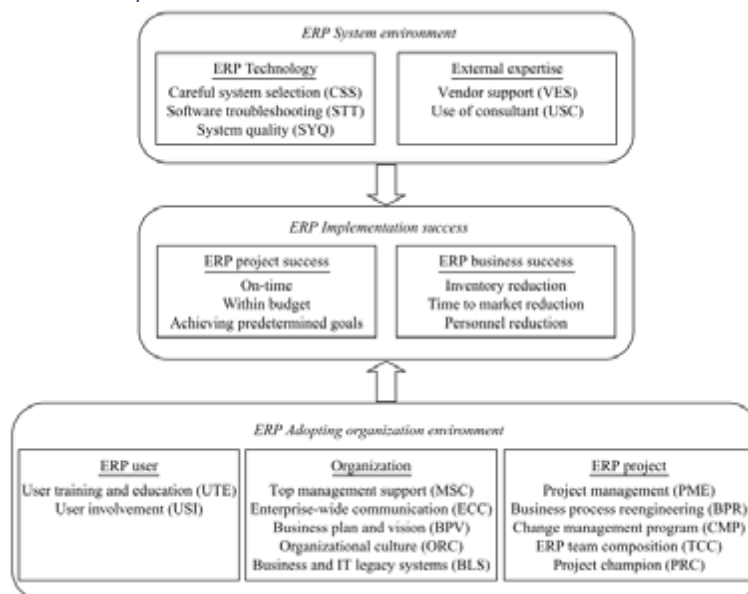


Figure 9-3: Taxonomy of CSFs (Dezdar & Sulaiman, 2009)



### 9.3.2 List of CFFs

Table 9-1: List of CFFs (Wong et al., 2005)

<b>Critical Failure Factors for ERP Implementation</b>
1. ERP system misfit
2. High turnover rate of project team members
3. Over-reliance on heavy customization
4. Poor consultant effectiveness
5. Poor IT infrastructure
6. Poor knowledge transfer
7. Poor project management effectiveness
8. Poor quality of Business Process Re-engineering (BPR)
9. Poor quality of testing
10. Poor top management support
11. Too tight project schedule
12. Unclear concept of the nature and use of ERP system from the users' perspective
13. Unrealistic expectations from top management concerning the ERP System
14. Users' resistance to change

## 9.4 Interview Design

### 9.4.1 Design of Semi-structured Interviews

#### A system analysis of ERP implementation challenges and coping mechanisms

<b>Classification information: Role of interviewee</b>		<b>Interview number:</b>	
ERP end user	<input type="checkbox"/>	<b>Company</b>	
ERP support user	<input type="checkbox"/>	<b>Date and Time:</b>	
Management role	<input type="checkbox"/>	<b>Duration:</b>	
<b>Other</b>	<input type="checkbox"/>		
<b>Job Title:</b>			

#### A: Introduction and Welcome:

Interviewee will be thanked for agreeing to the interview. The purpose and importance of the research will be briefly outlined. The interviewee will be required to sign the participant consent form.

The researcher's commitment to anonymity and confidentiality of the interviewee will be restated, providing verbal assurances that nothing would be attributed to the interviewee or the organisation.

The interviewee will be provided with the opportunity to state any concerns or request additional information where clarification is required.

#### B: The interviewer will advise the interviewee that they has the right to:

- |    |                                             |
|----|---------------------------------------------|
| 1. | Decline to respond to any of the questions; |
| 2. | May request a copy of the research results; |

C: General Information:		Permission granted
1.	Role in organisation and specific area of involvement during ERP implementation The different ERP systems used	For using quotations

#### D: General Themes:

- |    |                                                                                                                      |
|----|----------------------------------------------------------------------------------------------------------------------|
| 1. | How does the interviewee describe the ERP implementation experience?                                                 |
| 2. | As per the interviewee, what are the major challenges experienced during the different phases of ERP implementation? |
| 3. | Why does the interviewee see the above mentioned points as major challenges?                                         |
| 4. | What is the best way to improve/overcome the challenges experienced?                                                 |

	a. Any strategies used during the research process to overcome the challenges experienced?
5.	Why are they doing-what they say they are?

**E: Potential probing questions:**

	Set of spontaneous questions
--	------------------------------

**F: Conclusion:**

1.	Brief summary of what was discussed.
2.	Thank the interviewee for their time.

## 9.5 Photographic Evidence of Observational Data

### 9.5.1 SAP Systems Deployed in the Organisation

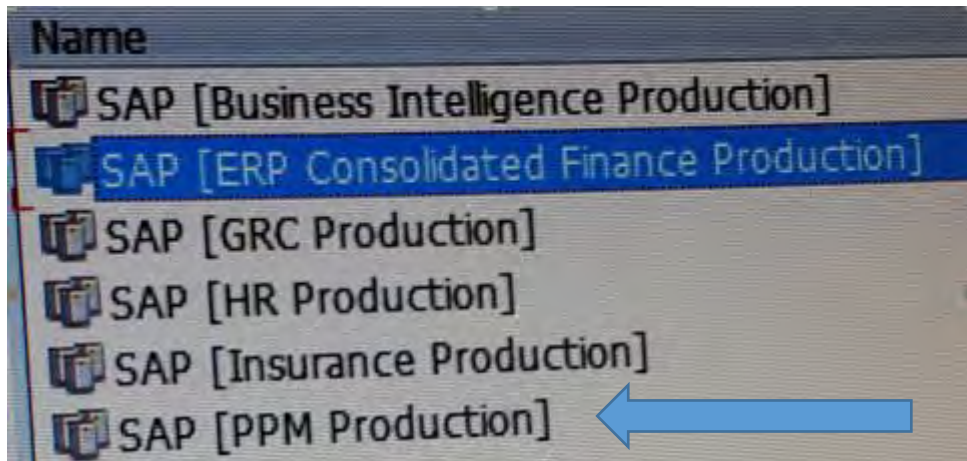


Figure 9-4: ERP Systems Used in the Organisation

### 9.5.2 Schematic of Different Operational Units

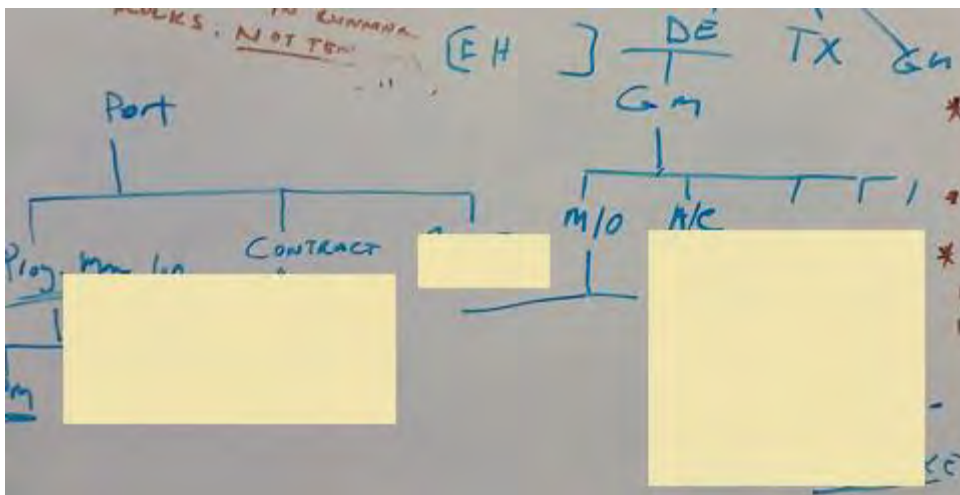


Figure 9-5: A Detailed Representation of the Organisational Structure

### 9.5.3 The Work Settings



*Figure 9-6: A Typical Workspace in the Organisation*



*Figure 9-7: Employees Engaging in a Meeting*